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Cliff Bekkedahl: 1930–2017

by Sheldon Bart

CAPTAIN CLIFFORD "CLIFF " LEWIS BEKKEDAHL, was a down-to-earth man who made *The Polar Times* (TPT) soar. The very first issue under his editorship (Spring-Summer 2001) had a cover photo of an Inupiat hunter literally leaping off the page. The picture was taken during a traditional whaling festival in Barrow, Alaska, an occasion when northerners celebrate a successful hunt by, among other things, catapulting one another skyward. Intentionally or not, that image presaged Cliff's effect on the publication. He gradually added more color, more original articles and a dynamic lay-out that transformed *TPT* into a real magazine. To my knowledge, he had no previous experience in publishing.

Captain Clifford Lewis Bekkedahl (December 11, 1930 – March 26, 2017) was a career Navy officer. He grew up listening to the radio program *Don Winslow of the Navy,* based on a comic strip character featured in two movie serials, and thrilling to literary accounts of the adventures of a real-life naval hero, Admiral Richard E. Byrd. He followed his boyhood dreams into Navy R.O.T.C. while attending Miami University. His most formative sea-going adventure occurred in 1955, when he was posted to the USS *Arneb* as a Lieutenant Junior Grade and navigator. An amphibious cargo assault vessel modified for cold-weather operations, the *Arneb* became the flagship for Rear Admiral George Dufek, commander of "Operation Deep Freeze I."

After a six-week dress rehearsal on Baffin Island north of the Arctic Circle, the *Arneb* turned south in November 1955 for Antarctica. Revisiting this voyage in the January 2007 edition of *The Polar Times*, Cliff described "two transcending events that captured that heart and left indelible images in the mind's eye, lifelong and undiminished."

The first [he said] is the sighting of the two-hundred-mile-wide Antarctic ice belt that yearly breaks away from the continent and drifts north to oblivion; once this is traversed, there is then open blue water and the subsequent, stunning confrontation with the towering Ross Ice Shelf. Yes, there are the Grand Canyon, fjords and mountains in the Rockies, Norway and the Alps, as well as Everest and many other magnificent mountain ranges and desert landscapes that contend for majesty; but having seen many, none match the ice of Antarctica for stark, breathtaking and unforgettable beauty.

Cliff and his fellow junior officers had unprecedented opportunities to maneuver the ship through the heavy pack and foul weather. This was because on the critical leg from New Zealand to the Ross Sea, Captain Lawrence Smythe lost his vision. Cliff omitted this detail from his narrative, presumably to protect the reputation of his former commanding officer. He was equally protective of *The Polar Times*, steadfastly keeping the magazine free of paid advertisements and resisting the idea of turning it into one more ephemeral online trifle. He would not allow *TPT* to become anything less than a keepsake.

Speaking of which, few people have had the opportunity to create their own monument, but Cliff did, conceiving, promoting, and masterminding the production of a massive compendium of *The Polar Times* articles going back to the very first issue brought out by our founder, August Howard, in July 1935. *Seven Decades and Seven Years of Service to the Polar Community: An Anniversary Edition of The Polar Times, Journal of the American Polar Society*, is a weighty, 285-page coffee-table book for anyone who has ever stood, with chattering teeth, savoring the warmth of a mug of coffee, in a snow-bound camp.

The *Anniversary Edition* is not just a one-of-a-kind treasure trove of historic images and text, but also a savvy projection of the next seventy years of polar possibilities. It debuted to rave reviews at the 75th Anniversary Meeting and Symposium of the APS at the Marine Biological Laboratory, Woods Hole, Massachusetts, 15-18 April 2013, and has delighted our worldwide membership on whose tables and bookshelves it reposes with singular honor.

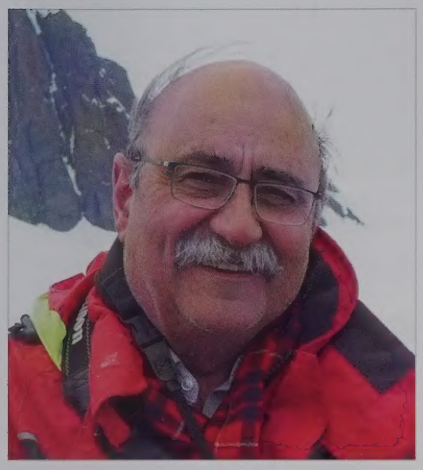
Only Cliff would have had the imagination to launch such a project and the passion and initiative to helm it to so successful a conclusion.

We who were privileged to know Cliff and contribute to *The Polar Times* and/or the *Anniversary Edition* will miss his friendship, encouragement, and, perhaps especially, the upbeat vernacular of his emails that seemed to somehow combine the colloquialisms of Damon Runyon's fiction and Al Capp's Dogpatch. We join with his wife of 60 years, Victoria, daughters Barbara, Carolyn, Alison and Mary Ann, brother Doug, and eight grandchildren in mourning his passing and celebrating his life.

Thank you, Cliff, for your service to our country, our Society and its journal. We know that somewhere you are standing another watch, marveling at a farther horizon of breathtaking beauty and majesty.

Acting President's Message

TO INCREASE AND DIFFUSE KNOWLEDGE OF THE POLAR REGIONS, TO INSPIRE PEOPLE TO CARE ABOUT THE ARCTIC AND ANTARCTIC. TO PROTECT THE POLAR UNKNOWN.



DEAR FELLOW AMERICAN POLAR SOCIETY MEMBERS:

It gives me great pleasure to write to you. I am currently Acting President of the American Polar Society. We have endured a series of changes including, sadly, deaths in our leadership ranks, and that has led to a hiccup in the normal production of *The Polar Times*, as well as in the planning for normal events of the APS. But, we are back on track and looking forward to future editions and renewed activities.

The American Polar Society was established in 1934. We've had an impressive history and have been actively involved in writing and sharing stories about polar happenings for almost 85 years. Everything in the polar regions seems larger than life. Our stories range from historical accounts of early explorers and scientists who spent years in the field with equipment much less comfortable than anything current to the exploits and contributions of teams on assignment today. Polar travels, the competition for resources, and environmental concerns are in the news every day and, looking forward, the APS could play an important part in shaping direction. There is no doubt we have challenges ahead in protecting the integrity of both polar regions. We are dedicated to rising to this challenge. From polar bears to krill, the health of the polar ecosystem is paramount.

For travelers to either the Arctic or the Antarctic, we say, "Join us." Have your voyage be a part of our polar history. We expect 2019 will be a creative and rejuvenating year for us. We will update our website, tackle other organizational tasks, and identify relevant projects.

After many dedicated years, Alfred McLaren, our talented and hard-working leader, chose to retire as President. Sadly, Cliff Bekkedahl, the Managing Editor of *The Polar Times*, and John Splettsoesser, the Board Chairman, passed away. Denise Landau stepped in as Interim President for a while, and now, I have assumed the role as we reinvigorate our efforts and continue to inform polar enthusiasts of ongoing and new endeavors and events at the poles. Sheldon Bart, our Acting Vice President, has been resolute in keeping the organization moving forward. And Moki Kokoris has agreed to assume the role of Editor of *The Polar Times*.

We look forward to hearing from you. We invite your comments on this latest issue of *The Polar Times* and your thoughts about our next steps. We always encourage news from our membership and welcome articles for publication.

All the best in the coming year!

Ray Arnaudo, Acting President, APS

Ray Arnaudo is a retired diplomat and former Senior Scholar at the American Association for the Advancement of Science, with a career of experience in international environmental and science policy affairs at the State Department. He is currently a member of the National Science Foundation's Polar Affairs Advisory Committee.

Letter from the Editor

DEAR READERS AND FELLOW POLARPHILES:

With respect to *The Polar Times*, there are no words I could write that have a more satisfying sound than.... WE'RE BA-A-A-ACK!

Indeed, we're back, not only with an imminent new APS website, but also a revamped journal. The past two years have been challenging, particularly after losing so many larger-than-life personas from within the higher ranks of the American Polar Society - all of whom were integral to our existence. It has been difficult to navigate through the metaphorical Polar darkness without those guiding spotlights, but after a few transitions, we are finally on course and sailing toward brighter horizons.

This issue of *The Polar Times* – while still paying homage to our former layout in order to include articles that had already been compiled by our past Editor Cliff Bekkedahl – will reveal its evolving metamorphosis. Cliff›s eminent boots won›t be easy to fill, but in picking up his torch to carry forward, I shall strive to do justice to his legacy.

Just as importantly, on behalf of each APS Governor, Officer, member, and particularly myself, I extend my gratitude to Charlotte Sinclaire for her many years of commitment to the production of our journal. Charlotte, we collectively genuflect in respectful appreciation for all your work.

Moving into this next phase for the APS, please join me in welcoming our new Art Director, Mary McBride, whose talents will transform our publication by way of a new style and more contemporary look. Having worked for many years with the NRDC, and for more than a decade at The Explorers Club, Mary maintains a quiet professionalism, with dedication to craft and quality. We are truly fortunate to have her in our midst.

As the new Editor, I have chosen to present the journal's content in sections, many of which will be regular features, i.e. "Explorer Showcase," "Indigenous Issues," "Expeditions," etc. The centerfold spread (and in this case also the front cover) will be reserved for the "Artist Showcase." The plan is to also feature one Polar travel company or tour operator per issue, with special "deals" for corporate partners.

Ideally, I would like the future *Polar Times* print journal to be a full sensory multimedia experience, employing Augmented Reality (AR) – an enhancement technology that makes 3D computer-generated images pop off the page when viewed through the camera on smart phone and tablet screens. However, until AR is more accessible, I have added QR technology, which offers anyone with a QR-code reader app on their smart devices a way to view videos and listen to interviews or music relevant to the article. For those of you who do have the app, go to i-nigma and download it. URL: http://www.i-nigma.com/downloadi-nigmareader.html.

Once you launch the app on your mobile device, point the camera at the black-&-white QR-code squares, and voila! The video will play or additional peripheral article/s and websites will appear! A perfect example is the vignette about Paul D. Miller aka DJ Spooky (p. 25). Not only will you have the opportunity to watch his Nat Geo Live talk, you'll can also listen to and download his "Of Water and Ice" music album. There's your soundtrack for reading *The Polar Times*! Exciting new feature? It certainly has been for me.

So... without any further ado... I proudly present to you the newest (and more techy) iteration of *The Polar Times*!

–Moki Kokoris, Editor

See 'Editor's Side Note' on Page 39

AMERICAN POLAR SOCIETY

The American Polar Society was founded on November 29, 1934, to band together all persons interested in polar exploration. Members are entitled to receive *The Polar Times* twice a year. The American Polar Society is classified as a tax exempt organization under Sec 501(C)3 of the IRS Code.

For more information about the American Polar Society, contact James W. Collinson, APS Secretary, at jimcollinson@q.com.

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Credit: Greenland, Mads Pihl

FROM THE EXECUTIVE COMMITTEE

I have pondered this issue of where the APS goes. The Society was founded in a different era, when the polar communities were small and many of the participants knew each other before embarking on expeditions. Times have changed and now the polar communities are large and diverse – even more so than when I first went south with USARP, a time when one would meet many of the participants in McMurdo. Now one hardly meets anyone because of the pressures to get scientists through McMurdo and out into the field, with the minimum of time in transit (both ways).

The pioneering and exploratory expeditions have been replaced by large science programs funded by the National Science Foundation and other agencies, and by tourist trips to both polar regions. Elaine and Merlyn have sought to spread the word about the APS to the science and support communities, but unfortunately with little success. The membership of the Society is dwindling as we all get older. The sort of camaraderie of the early expeditions and the early days of the Antarctic Program, which we all enjoyed and valued, no longer exists. The current generation of participants lives in a different world, and at least some of the scientists have their own community in APECS.

To survive, the Society has to change its purpose. The Society has to identify a new constituency, because, for better or worse, it will not be the science community. The one group of people who have the resources and potential interest in a greater involvement in the affairs of the polar regions might be found among the participants in tourist expeditions.

The Society will have to decide whether to be an association of like-minded travelers or an advocacy group. The first option could have a small office (no one can replace the one-man shop run by John Spletts) to provide a central point of contact, maintain a website, publish an online newsletter about the polar regions (politics, science, history, environmental issues, etc.) on a regular basis (not just once a year), and hold a symposium once a year (yes, I know that takes immense effort even with staff support).

An advocacy group would de facto be an NGO. Such requires a properly funded office capable of responding quickly to issues affecting the polar regions. A quick perusal of NGOs, from the Sierra Club to the Glen Canyon Institute, would reveal the task of setting up an advocacy office. A much more daunting task!

In either case, membership is critical for providing the resources to accomplish even limited aims. Promoting membership among the like-minded travelers requires collaboration with the cruise lines and those involved with their professional staff (the cruise directors/expedition leaders). I would advocate an "association" that might in time morph into an "advocacy" group. Having said that, I regret I no longer have the energy to be a substantive participant in any new direction that the Society chooses to take.

A little history. I was diverted from a career in economic geology by hearing Duncan Carse speak at the Royal Geographical Society on his two years on South Georgia. I left the talk and walked round the corner to the offices of the British Antarctic Survey, and signed up. At the end of my contract, and while contemplating positions in economic geology, I had bait dangled in front of me by Colin Bull, then Director of the Institute of Polar Studies at Ohio State University. So, in 1966, I came for just one year on a post-doctoral fellowship. But I now return to England every autumn for the Hope Bay reunion and time with compatriots with whom I dog sledged on the Antarctic Peninsula. That is the camaraderie on which the Society was founded. We have to find a new purpose and direction.

David Elliot

VISION STATEMENT

Once there was an organization that found itself in a situation like the American Polar Society today. It was an academic society with an aging and diminishing membership. Then a new CEO was brought in, who understood that this nonprofit could appeal to a much wider range of people. He worked to broaden the scope of the organization, and the organization thrived and grew. This happened more than a hundred years ago. The name of the organization is the National Geographic Society.

As David Elliot suggests (above), the need exists to increase and disseminate knowledge of the polar regions, to inspire people to care, as we do, about the Arctic and Antarctic. We need to broaden our constituency and our horizons. To point the way, I present my vision of the next symposium of an invigorated American Polar Society.

It should be a session of all things polar.

There should be a session on science; there should be a session on policy. There should be a session on the polar technology of the future. (Lockheed Martin has developed a hybrid airship for polar operations. Canadian engineer and investor Charles Bombadier has designed an all-terrain cruise ship that can travel on water, land and ice, and explore the Arctic and Antarctic on treads.)

There should be a session on the indigenous peoples of the Arctic. The Inuit face serious drug and suicide problems, and food shortages. They have become dependent on foods flown up from the south—at exorbitant prices—and they and the people of northern Russia are dealing with obesity and diabetes as a result of having had processed foods introduced into their diet. We need their representatives to speak at the next symposium.

There should be a session on tourism—how polar tourists have changed over the years (lots of young people going north and south now), what they desire from the experience, and how expedition leaders deal with them.

There should be a session on military developments, what the armed forces are doing to respond to polar challenges.

There should be a session on geoengineering ideas to mitigate climate change, such as the American architect Derek Pirozzi's 2013 prize-winning "polar umbrella" to provide shade on Arctic sea ice and house research and tourist facilities. And the Pleistocene Park project, an effort to recreate in eastern Siberia the ecosystem of the last ice age.

There should be a session on polar history—new slants that have emerged in recent years—and polar photography, and we should be giving awards for the best polar images, best polar documentaries and best polar books.

Can you see the opportunities before us to enrich the APS by including new polar constituencies and a wider variety of polar experiences? Peter Drucker, a famous management guru, said: "The starting point is to recognize that change is not a threat. It's an opportunity." The world of polar enthusiasts is growing, and our organization can grow with it. We can build a broader, outward-looking and forward-looking American Polar Society. An American Polar Society for everyone who identifies with the last frontier on Earth.

Sheldon Bart
Acting Vice President, APS

Remembering Brian Shoemaker (1937-2017)

WE ARE ALL INDEBTED TO CAPTAIN BRIAN SHOEMAKER, USN, because without him there would be no *Polar Times* and no American Polar Society. In addition to rescuing the APS, he also single-handedly brought a new, relatively younger generation of members into the organization. Including me.

In my case, it started when I was organizing my first expedition—and called Brian last! Seeking sponsors, I compiled a list from library references of organizations with an interest in exploration. The entry for the American Polar Society explicitly stated that it did not fund or sponsor anything. I didn't call the APS until I had struck out with numerous other organizations that did subsidize field projects. But it was the best call I made.

Brian saved the expedition by steering me to less visible sources of funding. More than that, he encouraged me in my ambition to pursue what in conventional circles may have seemed like folly. He told me that most people who have gone to the polar regions were members of military missions or staff scientists of government research programs. He gave me a lot of credit for mounting my own project. I enjoyed talking to him because I could always sense a smile in his voice and the assurance of someone who knew what he was talking about.

He was the first person I called when I returned from the Arctic. I can't say I was impressed with the outcome of my initial command, but Brian summoned up examples from polar history that lifted my spirits. I had run into the same problems my more illustrious predecessors had also encountered. Shortly after that, knowing I was a writer, Brian prevailed on me to update the APS Constitution and lured me to OSU in 1998 for the first-ever APS symposium, a gathering of Polar Pioneers. The landmark event was attended by, among others, Vice Admiral James Calvert, commander of the first submarine to surface at the North Pole, and Colonel Joseph O. Fletcher, who landed a C-47 on iceberg T3 in the Arctic Ocean.

I arrived late and wandered into the Board meeting after the opening reception to gauge the reaction to my work on the constitution. That's when I met Brian in the flesh. He wasn't as big as his voice led me to imagine, but he was fully in charge, holding down the position of secretary, which, in reality, should have been designated executive director. He was the master of ceremonies for the symposium and the mastermind that made it a glittering success.

On a tour of the university archives the next day, I beheld OSU's collection of 550 boxes of the papers of Admiral Byrd and first thought about writing a biography of the explorer. Brian encouraged me immensely in this task and pointed me towards numerous sources of information. At a subsequent OSU conference, he gave me my first navigation lesson—a must for understanding what Richard Byrd was about. Brian jotted it all down on the back of a napkin.

My research on Byrd led me to understand a certain tradition among commanders that Brian embodied: the continuing bond of leader and follower. In exchange for the follower's hard work and contributions, the leader, in turn, provided whatever assistance he could to support the follower's subsequent endeavors. Admiral Byrd would say, "If there is ever anything I can do for you, do not hesitate to ask me." That was Brian's credo as well—a Navy tradition, I suspect.

Born on the 4th of July, 1937, Brian joined the Navy after graduating from the University of California at Berkeley in 1959. He was commissioned an Air Intelligence Officer, flew helicopters out of McMurdo Station in Antarctica, and conducted research at the Naval Arctic Research Laboratory in Barrow, Alaska, to earn a graduate degree in oceanography under the auspices of the Navy. In 1975, he returned to Barrow as commanding officer of the Arctic Research Lab. He was assigned command of the Naval Support Force Antarctica seven years later.

Following retirement in 1988, he studied at the Scott Polar Research Institute in Cambridge, England, earning another post-graduate degree, became involved in deep-sea treasure hunting, and campaigned for the restoration of the *Hero*, a research vessel that plied the icy seas of Antarctica for the National Science Foundation.

Nineteen eighty-eight was also the year that August Howard, founder of the American Polar Society, passed away, and the APS almost died with him. The last issue of *The Polar Times* under Howard's stewardship appeared in June 1986. Both it and the organization were revived when Brian Shoemaker took the helm in 1992. Another polar stalwart and long-time APS member, Jeff Rubin, author of Lonely Planet's *Antarctica*, called Brian "Our second founder."

In addition to pathbreaking symposia and editorial and administrative direction, Brian also conceived of an Oral History program to preserve the stories of an elder generation of polar pioneers, military and civilian. He secured a $50,000 grant from NSF—no easy task—and conducted dozens of interviews, usually fitting multiple subjects on the same extended trip to keep expenses manageable.

Brian Shoemaker died at 79 on January 20, 2017, survived by his wife Johanne, son Robert, daughter Ingrid, and two grandchildren. On February 2, 2018, his ashes were interred with full military honors at Arlington National Cemetery in Washington, D.C.

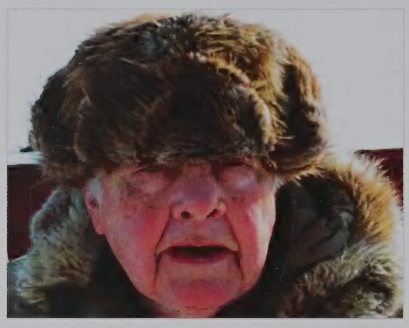
Personally, I was not surprised that tributes have turned up online from men who served in the Navy with Brian. "By far the best officer I ever worked for," said one. "The enlisted sailors thought the world of him," said another. I thought the world of him, too.

I gave Brian a cameo sort of role in a piece of fiction I once wrote. The setting was an occasion like the Polar Pioneers gathering at OSU. I described him as someone having "the knack of command about him," who "stood straight, rocking slightly on the balls of his feet," a kibitzing fellow "with a knowing look."

That's how I'll always remember him.

Sheldon Bart
Acting Vice President

Donn Keith Haglund, 1927– 2017



(Reprinted from the Panther *newsletter published by the University of Wisconsin - Milwaukee, College of Letters & Science, Department of Geography. Used by permission.)*

We are deeply saddened to share news of the death of Donn K. Haglund, Professor Emeritus of Geography, who served UWM as a faculty member for over 40 years. His unique and remarkable career, recognized with a Lowell Thomas Award, was distinguished above all by his passion for and dedication to the Arctic.

After discovering his love of geography as a child, Professor Haglund graduated Phi Beta Kappa from Drake University with honors in geography, then earned his PhD in Economic Geography at the University of Pennsylvania. His dissertation on western Greenland helped establish him as an expert on maritime transport to support Arctic economic development.

In addition to teaching for the UWM Department of Geography from 1958 – only two years after the University's founding – to 2003, he served as a visiting professor at the Universities of Alaska, Carleton, Calgary, McGill, Saskatchewan, and Stockholm, and he lectured at Oxford and Cambridge. Having led his first classes at the Wharton School at the age of 21 in 1948 and served as a guest lecturer for UWM Geography as recently as the early 2010s, he taught college students in eight different decades.

Of the many courses Dr. Haglund taught at UWM, the most distinctive and memorable was the Arctic Winter wilderness field course, which he led for over 25 years. The course gave students the opportunity to complete projects at sites across the Arctic, including Alaska, Canada, Greenland, Iceland, and Scandinavia. Two students from this class discovered the northernmost point of land on Earth: Oodaaq Island, just off the coast of Greenland.

Professor Emeritus Mick Day cited the course as an inspiration for his own popular fieldwork course: "Donn was a good friend to me throughout my career in the UWM Geography Department, and his Arctic field courses inspired me to develop the tropical fieldwork course." Professor Haglund's passion for the North also extended to service. Bishop Emeritus of the Diocese of Churchill- Hudson Bay, Reynald Rouleau, wrote of "his ability to inspire people with his passion for the North and stand in solidarity with those of us who live here." Through his church in Whitefish Bay, Dr. Haglund organized work camps through which he and other congregation members volunteered time and labor to improve a church building in Nome, Alaska. Professor Haglund also regularly attended the famous Iditarod Sled Dog Race and eventually became a member of its organizing committee.

Dr. Haglund served as President of the Wisconsin Geographic Society, Governor of the American Polar Society, Chairman of the Board of Governors of the Arctic Institute of North America, and Vice President of Monaco's Comité Arctique International under the Honorary Chairmanship of Prince Rainier, and he was inducted into the prestigious Sigma Xi for his service to Science and Society. He was also instrumental in planning the centennial of the Association of American Geographers in 2004.

He served the Department of Geography and UWM in a variety of capacities, including Department Chair and Associate Dean of Scholastic Affairs in the College of Letters and Science. He brought Phi Beta Kappa to UWM, and he played a founding role in UWM's longstanding American Indian Studies Program. We will all miss Professor Haglund, and we are deeply grateful for his long and remarkable career, which was instrumental in helping UWM Geography grow into the thriving University of Wisconsin - Milwaukee 3 department it is today. To read more about Professor Haglund's career, please see http://www.americanpolar. org/donn-haglund/.

REFLECTION

"We all addressed Professor Haglund as "Doc." Over the years, "Doc" became "Donn" and I can truly say that, of all my university professors in both undergraduate and graduate school, he has had the most profound influence and impact on my life. His program was extraordinary for the latitude he gave to explore a cultural or scientific aspect of the Arctic that was most compelling to each one of us. Every student conducted his or her own research project in the Arctic and shared their results at the conclusion of the field work once we returned to home base in Milwaukee.

Dr. Haglund had the foresight to make certain we were a cohesive, bonded group before we took off for the North. He demonstrated 'Shackleton' style inter-personal skills that even Shackleton could have benefited from. Following each class at UWM, we all headed to the University's Ratskeller to share stories and really get to know one another in a very informal way. By the time we boarded our flight to Montreal, we were not only "Doc's students", we were all good friends who would look out for one another as we landed on the ice. The camaraderie amongst us was palpable.

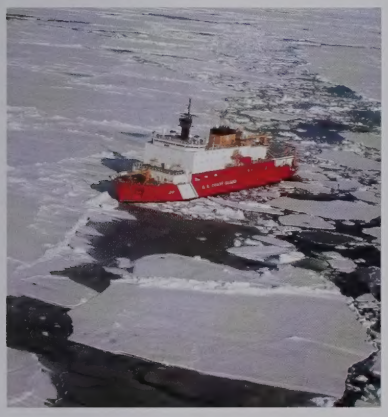
Donn Haglund made lifelong friends in the Arctic wherever he traveled. He was always mindful of exposing his students and fellow travelers to the cultural nuances and economic concerns of Inuit and First Nation people and to the science of climate, fauna, what flora there is to be seen and of course, the geography of the North.

In Pangnirtung, Donn made sure that we saw the inside of Inuit homes, witnessed Easter celebrations and the ordination of Inuit ministers in the local "Pang" church and gave us tours of the renowned Uqqurmiut Centre for Arts & Crafts. We even participated in a Friday night dance with the local Inuit population in Pangnirtung.

Donn immeasurably influenced and changed the lives of hundreds of university students during his academic career. A great many of his students will tell you that studying under Donn Haglund at UWM and experiencing his impeccably well-organized Northern Land field trips was a life-changing experience."

— Mary Elizabeth Gray, BS alumna.

ARCTIC TASK FORCE REPORT FROM THE COUNCIL ON FOREIGN RELATIONS



The Coast Guard cutter Healy *cuts a path through the Antarctic ice.*

by Lawson Brigham

Submitted August, 2017

AFTER A YEAR-LONG STUDY, the Council on Foreign Relations (CFR) released a task force report, *Arctic Imperatives: Reinforcing U.S. Strategy on America's Fourth Coast,* in Washington DC on 22 March and in New York on 23 March (2017). The report emphasizes that the U.S. has significant strategic, economic and scientific interests in the region, and that the Nation needs to 'increase its strategic commitment to the region or risk leaving its interests unprotected.' Co-chaired by Admiral Thad Allen, former Commandant of the U.S. Coast Guard, and former Governor of New Jersey (and EPA Administrator) Christine Todd Whitman, the task force included 18 additional members from academe, think tanks, the private sector, and an environmental organization. The timing of the report's release is important since the U.S. will relinquish its chairmanship of the Arctic Council to Finland in May 2017 at the Arctic Council Ministerial meeting in Fairbanks. The CFR's hope is to maintain the momentum of our chairmanship and the visibility of Arctic issues with a new Administration.

The Task Force identified six main goals for the United States in the Arctic:

- Securing U.S. rights to perhaps more than 386.000 square miles (I million square kilometers) of subsea resources on the extended continental shelf by ratifying the UN Convention on the law of the Sea (UNCLOS).
- Funding up to six icebreakers operated by the U.S. Coast Guard and having at least three operational in the polar regions at any one time.
- Improving telecommunications, energy, and other infrastructure in Alaska to support a sustained security presence and economic diversification.
- Deepening work with all Arctic states, including Russia, on confidence building and cooperative security measures through the Arctic Council.
- Supporting sustainable development for the people of the Arctic and further consulting with Alaska Natives to improve their well-being.
- Sustaining robust research funding to understand the ongoing profound changes in the region and their impact on the globe.

The profound climate changes and impacts on Alaska and the circumpolar region are addressed early in the report. Arctic sea ice retreat and rising surface air temperatures (twice that of other regions) are highlighted. The bipartisan approaches to the Arctic by Presidents George W. Bush and Barack Obama are reviewed as well as the importance to the U.S. of the Arctic Council, an intergovernmental forum focusing on environmental protection and sustainable development. The CFR task force recommends that the Senate provide its advice and consent on ratification of UNCLOS to secure U.S. legal rights to resources on the continental shelf in the Arctic. Ratifying UNCLOS also would enhance U.S. critical assertions of freedom of navigation not only in the Arctic Ocean but around the global oceans. A key recommendation is the elevation of Arctic issues in U.S. bilateral relations with Canada and the Nordic countries.

Three chapters of the report focus on national security issues; economic, energy and environmental interests; Alaska, and Alaska Natives. Polar icebreakers and the lack of a robust fleet of modern icebreaker operated by the U.S. Coast Guard gained significant attention within the Task Force. Recognizing that the U.S. has significant national interests in the Arctic and Antarctic, the study recommends that the Nation needs to fund up to six icebreakers (operated by the Coast Guard) to meet our national interests and commitments in polar waters. Additional investments are needed to maintain U.S. Arctic underwater naval capacities, improve domain awareness for security and economic activity; and, complement NORAD's air defense system with an updated land and sea alert system. The lack of infrastructure, particularly in the U.S. maritime Arctic (from the Aleutian Islands to the U.S.-Canada border in the Beaufort Sea), merits significant attention by the CFR Task Force. Infrastructure requirements are broad: telecommunications; search and rescue capacity; an Arctic Alaska Deepwater port; Arctic weather prediction; hydrography and charting; mapping and elevation models of Alaska; and, more. In a key issue for international the Task Force recommends that the U.S. work with other Arctic nations to enhance satellite coverage over the Arctic for environmental monitoring and telecommunications.

Arctic marine transportation issues are addressed in the report and but there was no clarity in the viability of trans-Arctic maritime operations for the future. Noted is the difficult Arctic operating environment although there is increasing marine access and potentially longer seasons of navigation as a result of the profound re-treat of Arctic sea ice. The Arctic Council and several international organizations have given focused attention to Arctic marine safety and environmental protection issues. The report notes the International Maritime Organization's (IMO) Polar Code for Ships Operating in Polar Waters. The Polar Code came into force on 1 January 2017 and the Arctic and flag states have initiated key implementation and enforcement strategies for these new international rules and regulations. Ecosystem-based approaches including marine protected areas (MPAs) are discussed as effective management

Credit: Henry Dick, National Science Foundation

measures for the Arctic; flexible and adaptive approaches are required in all future marine-managed areas.

The U.S. is an Arctic nation because of Alaska and a critical section of the report focuses on the State and Alaska Natives. The CFR Task Force team visited Alaska in summer 2016, and met with a host of owners and stakeholders. The report acknowledges Alaska's abundance of natural resources but also indicates the economic vulnerability of the State with the drop in global oil prices (that have triggered significant State budget deficits). The Task Force report notes that the Alaska Native concept of food security includes the well-being of the environment; also, that Arctic climate change is dramatically impacting Alaska's coastal communities and sustainable livelihoods. The Task Force recommends the federal government bolster efforts to improve access to safe drinking water and sanitation throughout Alaska, and work with the State to safeguard subsistence hunting, fishing and gathering.

The 21st century Arctic is being influenced by globalization (the linkages of Arctic natural resources to global markets), profound climate change, indigenous peoples concerns (and rights), and regional as well as global geopolitics. The U.S. has important national security, economic, social and environmental interests in the region. This report, which can be accessed on the Council on Foreign Relations web site at www.cfr.org/ArcticImperatives, provides a comprehensive review and recommendations for a U.S. response to many of challenges in this complex, but peaceful region.

POLAR CODE HERALDS A NEW ERA: SAFER NAVIGATION IN ARCTIC WATERS

by Lawson Brigham

Alaska Dispatch News, 10 January, 2017

A HISTORIC MILESTONE WAS REACHED, on New Year's Day 2017, when the International Maritime Organization's Polar Code for Ships Operating in Polar Waters came into force. The "Polar Code," as it is widely known throughout the maritime world, is designed to improve marine safety and enhance protection of Arctic peoples and polar marine environments. It is a ground-breaking marine governance regime for the Arctic and southern oceans. The code establishes mandatory and voluntary international standards for new and existing commercial ships and passenger vessels (all 500 tons or more) operating in Arctic and Antarctic waters. In contrast with Canada's Arctic Shipping Pollution Prevention Regulations and Russia's Rules for the Northern Sea Route — both long established within national statutes — the U.S. has lacked special polar ship rules and regulations to govern marine operations in its maritime Arctic. This situation will change as the U.S. Coast Guard begins to implement and enforce the many elements of the Polar Code during a two-year, phased application to ships sailing on international voyages in Alaska's polar waters. Canada and Russia are merging their national regulations with the Polar Code; Denmark (for Greenlandic waters) and Norway (for Svalbard) are taking measures to implement the Code in their Arctic waters.

The Polar Code will be applied in all Antarctic waters south of 60 degrees south. This boundary around the Antarctic continent corresponds to the northern boundary of the Antarctic Treaty. In the Bering Sea, the code's boundary has been established at 60 degrees north to correspond roughly with the winter maximum extent of sea ice and as an added measure of protection for the region's world class fishery. The code's boundary in the North Atlantic has been adjusted to take into account its warmer waters and runs south of Greenland, north of Iceland and Norway, and intersecting east of Russia's Kola Peninsula. These marine areas are well north of the Arctic Circle and remain ice-free throughout the year.

The Polar Code is a set of amendments to existing IMO agreements, or conventions, on safety, environmental protection and mariner qualifications including experience and training. New ship structural standards and marine safety equipment have been developed that are relevant to operating in remote, polar waters. A Polar Ship Certificate issued by the flag state (nation under whose laws the commercial ship is operating) will be required as well as a ship-specific Polar Water Operational Manual. Oil and noxious liquid discharges are prohibited in polar waters under the Code; limits are placed on the discharges of sewage, garbage and food wastes. New requirements and a certification process for polar experience and training for all ship's officers and crew will be in force by January 2018.

The history of the Polar Code dates back to the 1993 formation of an outside working group to IMO that drafted the first framework document. The IMO initially developed voluntary guidelines for ships operating in Arctic ice-covered waters. By 2009, the guidelines were updated by IMO to include ships operating in polar waters, regardless of the presence or absence of sea ice. In 2010, IMO's key marine safety and environmental committees began the lengthy negotiation process for a mandatory Polar Code that was recommended by the Arctic Council in its 2009 Arctic Marine Shipping Assessment.

All eight Arctic States share the leadership challenge and responsibility in the Polar Code's implementation and enforcement. There may be key, cooperative roles that the new Arctic Coast Guard Forum can address in this process. Ship classification societies and the marine insurance industry will be important players in evaluating the future risks of polar ship operations and assisting the flag states in the code's implementation. The IMO will continue to develop future polar-specific rules addressing such issues as heavy fuel oil use in the Arctic, ship emissions controls and future discharges.

Quietly, New Year's Day 2017, was among the most monumental dates in the history of the Arctic Ocean. The IMO's Polar Code will long be remembered in Alaska and throughout the circumpolar world as a seminal achievement that advanced protection of Arctic peoples and the marine environment while creating a uniform, nondiscriminatory set of rules and regulations, essentially a level playing field for future Arctic marine operators. And critical additions to the Polar Code will evolve in the years ahead further making it a centerpiece for governance of Arctic shipping and marine operations in the 21st century and beyond.

THERE'S NO COLD WAR AT THE POLES

by Ray Arnaudo

November 30, 2017

IN THE WORLD'S TWO POLAR REGIONS, COLLABORATION IS THE RULE.

CAN YOU BEAR SOME GOOD NEWS?

The headlines of the Daily Blatt are a steady drumbeat of woes, from North Korea to Syria to Ukraine. But consider this: World peace reigns in the Polar Regions! Give thanks, in part, to the Antarctic Treaty, signed on December 1, 1959.

After World War II, there was a fear that Antarctica might become a place for great powers to conduct nuclear tests, dump hazardous waste or even stockpile weapons. The Antarctic Treaty – originally known as the Washington Treaty after the city where it was negotiated – was intended to protect the frozen continent. Building on coordinated scientific endeavors dating back to 1882, the treaty dedicated Antarctica to peaceful cooperation.

Of the 12 countries that first signed it – including the U.S. and the Soviet Union – seven had previously staked claims to sectors of the continent. In a stroke of genius, the treaty simply deferred these claims – putting them on ice, as we in the business like to say. Today more than 50 countries have signed the treaty, and about 30 maintain Antarctic research stations.

The result is that south of 60 degrees latitude, scientists from around the world meet to exchange findings under the nodding approval of their governments. Americans, Russians and Chinese cooperate. South Korea is a party to the Antarctic Treaty, and North Korea is, too. Even during the Falklands War in the 1980s, the British and Argentine representatives continued to attend meetings.

On the other end of the globe, the eight Arctic nations with land or waters above 60 degrees latitude began discussing regional cooperation in the mid-1980s. In 1996, they created the Arctic Council as a forum. Military matters and those involving fisheries were excluded, mainly since they were covered by other agreements. But for the past two decades, the Arctic Council has overseen a broadly successful partnership on everything from environmental protection to sustainable development to indigenous rights. Along the way, it has sponsored peace.

U.S. postage stamp commemorating the Antarctic Treaty. U.S. Postal Service; National Postal Museum. Bureau of Engraving and Printing. Designed by Howard Koslow.

So, in the world's two Polar Regions, collaboration is the rule. It is worth noting that both the Antarctic Treaty and the Arctic Council were built on scientific exchange, which continues apace. New research stations in the Antarctic are planned with complete oversight by all parties. In the Arctic, three new regional agreements have been concluded in the past three years, focusing on issues like the maritime and navigational difficulties of search and rescue.

Perhaps this success at the poles might inspire solutions for other problem areas, like the South China Sea. One wag many years ago, looking at the success of the Antarctic Treaty, proposed raising its latitude boundary by 10 degrees a year: "In no time at all, there would be world peace!" That might be a little simplistic, but never underestimate the power of scientific cooperation. Surely there is something that North and South Korean ornithologists could study together.

Arnaudo, R. (2017, December 1). There's No Cold War at the Poles. *Wall Street Journal*, p. A1.

Ray Arnaudo is a former State Department official who retired from the secretary's Policy Planning Team in 2014. He directed U.S. policy in the Polar Regions from 1995-2005.

Map of Arctic Council members. Member countries are in dark blue. Observers are in light blue.

THE DUCK HUNT: A SEARCH FOR THREE AMERICAN HEROES LOST ON THE GREENLAND ICE SHEET

by Jim Salazar

▲ *GPR-drone integrated system during survey mission.*
◀ *Drone pilot supervising the preplanned surveying flight of the GPR-drone.*

THE FALLEN AMERICAN MISSING IN ACTION REPATRIATION FOUNDATION (FAMIARF), in partnership with Hot Point Solutions and a team of independent specialists, has spent the last several years testing their revolutionary radar technology against the ultimate control: the brutally inclement environment of Greenland. The results of these expeditions have cemented FAMIARF's theory that this system of Ground Penetrating Radar (GPR,) transported by drone, can locate downed aircraft with accuracy unlike anything the field of Search and Rescue has seen. This development is pivotal, as FAMIARF's primary objective for 2019 looms near: to locate the United States Coast Guard J2F Duck, a single-engine, amphibious aircraft used in WWII, and to repatriate the remains of the three United States Coast Guardsmen that were likewise never recovered.

In 2018, FAMIARF experienced a pivotal victory, locating a downed, WWII-era P-38 fighter aircraft. The discovery was momentous: from 340 feet beneath ice, FAMIARF extracted a sample of vivid, red hydraulic fluid. While this was an exceptional discovery in itself (with the P-38 scheduled for excavation in 2019), it was also a portent of things to come. FAMIARF's radar technology is proving formidable–and is crucial when navigating a crevasse-laden terrain as complex and unpredictable as the southeast of Greenland.

This modern technology may draw a historical saga to its close, and the families of the fallen servicemen certainly hope that it will. As the result of a catastrophic chain of events during 1942, several servicemen perished in Greenland.

A B-17 "Flying Fortress" carrying nine crew members went down as well, near the frigid Koge Bay. Although the radio was broken, the crew was ultimately able to repair it, and after communicating an SOS, a U.S. Coast Guard Grumman Duck arrived with supplies. Two of the servicemen were able to leave with the rescue Grumman Duck, but in the innavigable weather encountered on a return rescue attempt, the Duck itself went down, killing all on board.

2019 will see FAMIARF, working with the U.S. Coast Guard and the Defense POW/MIA Accounting Agency (DPAA), embark on a search for the crew members of the Grumman Duck. The objective, however, is not merely to locate the aircraft. FAMIARF's mission is held strongly in the hearts of its members, as well as its founder and director, Jim Salazar: our lost American heroes in Greenland must be located and repatriated to their families and the country they died to protect.

FAMIARF's radar technology, borne by a fleet of drones each manned by a team of specialists, is designed to make relatively short work of what would otherwise be an exceptionally dangerous, and perhaps an impossible, effort. The technology of the future is arriving in Greenland, and not a moment too soon for the heroic servicemen that have awaited their repatriation for over 75 years.

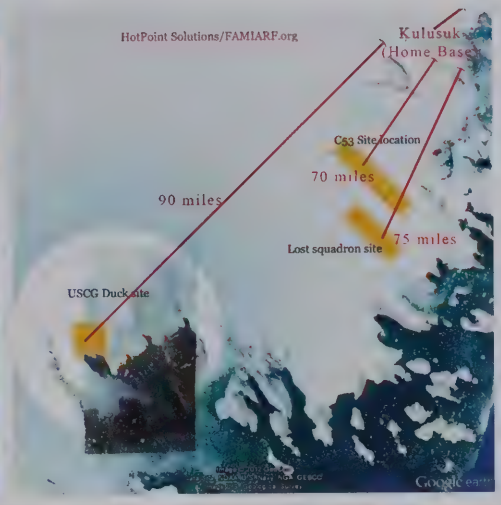
Jim Salazar, founder and executive director of the Fallen American Missing In Action Repatriation Foundation (FAMIARF), states that "We have the will, we have the skillsets, and now we believe we have the technology to bring to fruition our goal of repatriating our fallen servicemen, bringing closure and comfort to the Gold Star families of these American heroes. Once success is achieved in this mission, we plan to bring the same kind of effort to other possible recovery sites, devoted to the promise of bringing them home."

For more information or to volunteer time or resources, contact them at info@famiarf.org or by phone at (202) 465-4228.

About FAMIARF/Arctic Hot Point Solutions

FAMIARF/Arctic Hot Point Solutions consist of a volunteer team of experienced pilots, polar experts, geophysicists, glaciologists, and other dedicated citizens intent on finding and repatriating lost servicemen in cold regions. It is a nonprofit organization dedicated to finding the remains of servicemen who lost their lives during WWII and other conflicts. FAMIARF is currently working with the Department of Justice (DOJ), the Defense POW/MIA Accounting Agency (DPAA), and the U.S. Coast Guard. Founder/Director Jim Salazar.

Photos permission: Jim Salazar/AHPS/Fallen American MIA Repatriation Foundation (FAMIARF)



Clockwise, from top left:
Ground surveying before launching the drone.

Overview map of future missions – including USCG Duck site, 70-90 miles south of Kulusuk, Greenland.

The crew from the Fallen American MIA Repatriation Foundation in Greenland. Their motto: "Honor the promise and bring them home." From left: Jim Salazar, Mario Carnevale, Ken McBride, Myles Danforth, Alexey Dobrovolskiy, Janis Kuze.

QR-code to the Duck Hunt search video (2011).

The Coast Guard Grumman J2F-4 Duck, a small, single-engine amphibious plane that vanished in a storm during an effort to rescue a crashed B-17 crew in late November 1942, with three men aboard.

Positioning the drone – Mario Carnevale and Myles Danforth from Hager GeoScience Inc., USA.

ALL IN A DAY'S WORK

Credit: Mark Robinson

by George Kourounis

August, 2018

I HAVE WHAT IS PROBABLY ONE of the strangest professions – the kind you dream up when you're about 8 years old and then forget about when you "grow up." I'm an explorer. I make my living by travelling the world, documenting the most extreme places, and then sharing what I've discovered with the world. I do that through my talks, social media postings, and most often by hosting numerous television programs such as "Angry Planet" (Amazon Prime Video), "Stormhunters" (The Weather Network) as well as "What On Earth?" and "Strange Evidence" (Science Channel). My specialties are extreme weather, natural disasters, volcanoes, and inhospitable places such as the Polar Regions. Basically, any time that Mother Nature is flexing her muscles, I'm usually nearby with my camera rolling.

There's something about being witness to the raw power of a tornado, or bracing myself against the intense winds of a hurricane, or feeling the scorching heat radiating from a violently boiling lava lake that pushes me to travel to the ends of the Earth. Most people will never see such things firsthand (many wouldn't want to!) but seem to love watching the images and hearing the stories. They experience them vicariously. I absorb the risk for them, and in my 20 years or so of doing this, I'm proud to say that I've never so much as broken a bone.

That's not to say that the danger isn't real. There have been instances when I've had a tornado toss farm equipment at me, and I've had to dodge flying chunks of glowing-hot lava.

Then there was the time we were filming for *Angry Planet* in Ottawa, in a wind tunnel operated by the National Research Council. I was trying to show the audience the very worst winter weather imaginable by taking frigid -18C air from outside and sending it through the wind tunnel at 150 km/h. I was harnessed to the floor and as if that wasn't bad enough, they then sprayed me with water, which instantly atomized and froze onto me, emulating the combined conditions of a hurricane and an ice storm together. The wind-chill factor was literally off the charts! It's a good thing I was wearing many layers of clothing, a helmet, and had no skin exposed. Even though it was carried out under "controlled" conditions, I became encrusted in ice, and started to have difficulty breathing. The paramedic team on standby had to use a hammer and an ice axe to chip the ice off my face…

Credit: Peter Rowe

The ice man cometh... This is what happens to the human body when you combine an ice storm with hurricane force winds.

Do not try this at home.

Earlier this year, I had the tremendous honour of being named an "Explorer-In-Residence" by the Royal Canadian Geographical Society, and one of the duties in that role is to represent the Society in my travels around the world. The RCGS recently announced that they were partnering with One Ocean Expeditions, a polar expedition travel com-

pany, to commission the newest vessel in the One Ocean fleet. This new ship, christened the RCGS *Resolute*, will make its maiden Antarctic voyage in November (2018), and I have been invited to be on board this very special journey as an ambassador for the RCGS.

One Ocean Expeditions operates three vessels and travels to places like Antarctica, The Northwest Passage, Greenland, Svalbard and others. They were also heavily involved in the successful 2014 Victoria Strait Expedition – resulting in the find of Sir John Franklin's *Erebus* in the Northwest Passage. This will be my third time travelling to Antarctica aboard one of their ships.

While on this trip, I will be bringing the Antarctic experience to classrooms all over North America via satellite with the educational non-profit; Exploring By The Seat Of Your Pants. What EBTSOYP does is connect scientists, explorers, and field researchers with students in live, real-time broadcasts using the Google Hangouts platform. Multiple classes can connect at the same time, and the whole experience is interactive and free. Hundreds of these educational sessions have already been hosted from locations all over the world, but this will be the first one done from the Antarctic Peninsula.

Because the communication is two-way, the students may ask questions and interact with the researchers directly. It's a great way for schools to virtually take their students out into the wild, and hopefully get them excited about the natural world, conservation, and future careers in the STEM fields.

I will also be bringing the BGAN (Broadband Global Area Network) equipment with me on shore excursions so that participating students will be able to see and hear such things as Gentoo penguin colonies and glaciers calving.

People care more passionately about things they understand. By exposing young students to the amazing sights of Antarctica, engaging them in real-time discussions, and giving them the opportunity to talk with experts who are there, to ask questions, will hopefully inspire them to become the next generation of "polar protectors."

I look forward to reporting back in after the voyage and sharing details of how it all went, as well as the students' reactions.

George Kourounis is an Explorer-In-Residence with the Royal Canadian Geographical Society, a National Geographic explorer, and serves as the Canadian Chapter Chair of The Explorers Club.

THERE'S SOMETHING ABOUT BEING WITNESS TO THE RAW POWER OF A TORNADO, OR BRACING MYSELF AGAINST THE INTENSE WINDS OF A HURRICANE, OR FEELING THE SCORCHING HEAT RADIATING FROM A VIOLENTLY BOILING LAVA LAKE THAT PUSHES ME TO TRAVEL TO THE ENDS OF THE EARTH.

Rosie, our Inuit guide in Pond Inlet, Nunavut. She was great, and she recognized me from television right away. I guess they get "Angry Planet" via satellite all the way up here.

Credit: Mark Robinson

Credit: Peter Rowe

Relevant links:
George's Website: www.furiousearth.com

One Ocean Expeditions:
https://www.oneoceanexpeditions.com

oneocean EXPEDITIONS

Exploring By The Seat Of Your Pants:
http://www.exploringbytheseat.com

Exploring by the Seat of Your Pants
Question | Explore | Conserve

A SÁMI SCHOOL PRESERVES REINDEER HERDING, WITH HELP FROM THE INTERNET

Reindeer on a farm outside Kirkenes, Norway.

by Mia Bennett

Link to Mia's CRYOPOLITICS blog:
http://www.cryopolitics.com/

IN A PREVIOUS POST, I wrote about how a Concorde jet and Chinese tourists have irrevocably changed Lapland in the past three decades, and how a possible Arctic Railway may further upset the balance in this region of Finland that the Sami have called home for thousands of years. Despite – or perhaps partly in reaction to – these pressures, the Sámi are taking cultural preservation into their own hands.

Deep in the boreal forest 200 miles north of Rovaniemi lies the town of Inari, a place considered the Sámi capital of Finland. It's here where a dark wooded building called Sajos, the Sámi cultural and administrative center which also houses the Sami Parliament of Finland, lies nestled between an asphalt parking lot and some pine trees. A small supermarket and a few hunting outfitters and souvenir shops line the center of town, which was quiet on the cold, cloudy day we arrived. Out front, a woman walked two scruffy dogs while a black Porsche sat parked nearby.

As part of the Calotte Academy, a traveling symposium through northern Finland, Norway, and Russia, we stayed for a few days at Vasatokka, a Finnish Youth Centre on the shores of Lake Mutusjärvi. During our visit, two instructors from the Inari-based Sámi Education Institute gave presentations on Sámi cultural and language education. The institute provides vocational training across a range of subjects that help keep Sámi traditions alive while also preparing Sámi youth for employment in the workforce, be it in reindeer herding, tourism, or information technology.

Despite the fact that only 10% of Sámi are engaged in reindeer herding, the practice's cultural importance means it forms an instrumental part of the institute's curriculum. Jackie Hrabok-Leppajarvi, an associate professor originally from northern Canada, joyfully described the ease of teaching reindeer herding in Lapland. After she teaches students a certain skill in person, once they go back home, she asks them to demonstrate to her how they are implementing their new knowledge in the field via videos they send through a program called AdobeConnect. In Finland, the birthplace of Nokia, 4G is available in every lake, meadow, and stream. "It's awesome. It's very different than my Alaska," she exclaimed. Hrabok-Leppajarvi spends six months out of the year working at the University of Alaska Fairbanks, where she has a joint appointment. Deep in the bush in America's 49th state, it's much harder to determine if students are learning the tools of the trade because of the lack of cell phone service outside of the main settlements.

Learning to cook – and export – forest foods

The Sámi Education Institute also offers a variety of classes that teach students to make use of the ample resources around them, including ones that would normally go unremarked by the city-dwellers that make up 85% of Finland's population. In the handicraft classes, students learn to turn roots, birchbark, and reindeer skin into art. In cooking classes, recipes for traditional Sámi dishes like *kuu'mik* (a type of bread baked with a filling inside) and others using fish and mushrooms and herbs gathered from the soft forest floor are passed on.

Finland, the birthplace of Nokia, 4G is available in every lake, meadow, and stream.

Intriguingly, several preparations involve the use of cambium, the vitamin-rich inner bark of the pine tree. The Skolt Sámi, an Eastern Sámi people who inhabit the Kola Peninsula in Russia and nearby areas spanning the present-day borders of Norway, Finland, and Sweden, were particularly fond of it. They used special tools made from reindeer antlers to scrape the bark off the tree in early summer, when it is relatively easy to peel off in sheets, then ground it against reindeer skin until it reached the texture of a rough flour. Swedish and Finnish farmers, in contrast, only ate the food during times of famine. Demonstrating the versatility of the ingredient, Skolt Sámi served up pine bark flour as a porridge *(piets'hutt)*, mixed it with fatty reindeer stock in winter, ate it as a dessert soup *(peecimääli)*, and, for the ultimate Arctic snack food, combined the dry, slightly sweet flakes with fish roe and reindeer milk (source: Siida).

After the World War II, some Skolt Sámi continued to eat the pine bark, but they had to do so surreptitiously since they were supposed to pay for the use of the trees. While its local consumption has declined since a century ago, cambium may become the next trendy edible export from the Arctic after products like glacial water, cloudberries,

A former Orthodox church in an old Sami village in Neiden/Njauddâm, Norway, just across the border from Finland.

and sea buckthorn. The shop for the Arktikum museum in Rovaniemi sells sleekly packaged boxes of "Instant-Chaga," a freeze-dried tea made from Arctic Finnish mushrooms, for 99 euros each. Signs in English and Chinese promote the drinkable fungi's salutary effects (the dwindling numbers of Russian tourists probably have neither the spare cash nor the patience for such highfalutin beverages). Given the trendiness of superfoods and New Nordic cuisine, more wheatgrass-sipping millennials in Copenhagen, New York, and Shanghai than Skolt Sámi in Lapland may be making use of pine bark – this time sprinkled on kale and quinoa salads rather than on porridge.

Keeping the Skolt Sámi language alive

The Sámi Education Institute also prides itself on its language instruction. The second presenter of the day, Tauno Ljetoff, a reindeer herder and teacher of Skolt Sámi, a local dialect, noted that only 200-300 speakers are left among the approximately 2,000-3,000 Skolt Sámi. Their culture is unique from other Sámi subcultures partly by virtue of its adherence to Orthodox Christianity. Many Skolt Sámi still have Russian surnames like Romanoff. "It is an Eastern culture," Ljetoff remarked.

At a village a few hours away across the border in Neiden (Skolt Sámi: Njauddâm), Norway, an old wooden church with a three-barred cross symbolized the penetration of the religion and its adherents from the east at a time when Sámi and their reindeer, traders, and missionaries could move more fluidly across the tundra, before national borders began to be erected in the nineteenth century. The Skolt Sámi language and culture came under further pressure in the traumatic aftermath of World War II, when the area they inhabited in northern Finland, called the Petsamo region, was ceded to Russia. Petsamo's Skolt Sámi, many of whom had fought with the Finns against the Russians, were evacuated across the new border to Finland.

Within the local community, only one Skolt Sámi man speaks the language and his children do not want anything to do with it.

Ljetoff believes that the Skolt Sámi language can be successfully retained as long as 1–2% of the population acquires fluency. Reaching this figure is helped by the increasing popularity of learning Skolt Sámi within the community. "The attitude has changed," he noted. "There's more interest in teaching children Sámi, whereas before they taught them Finnish because it was felt that Sámi was a dying language."

Ljetoff's statement contrasted with what a museum guide at the Norwegian state-funded Skolt Sámi Museum (Skolt Sámi: Ä'vv Saami mu'zei) in Neiden said during our guided visit. She noted that within the local community, only one Skolt Sámi man speaks the language and his children do not want anything to do with it. This negative feeling may stem from the Norwegian state's stricter assimilation policies over the past several generations compared to the situation in Finland. This program of "Norwegianizing" the Sámi may have resulted in deeper feelings of shame towards identifying as indigenous. Compounding these negative perspectives is a perception within broader Sámi society of the Skolt being of inferior status. Neiden's museum, which opened in July 2017, hopes to change these views for the better.

The situation is more hopeful in Finland – a difference which underscores how seriously national borders have divided Sámi cultures, attitudes, and outlooks. This year, the Sámi Educational Institute saw 6 out of 15 of the students enrolled in its language program graduate. The school is taking its language program to Russia. Sámi daycare centers in Helsinki and other places in southern Finland have opened, while Sámi is even taught in some ordinary Finnish schools.

As with reindeer herding, the internet is vital to providing instruction to those interested in learning about Sámi culture. This is especially the case for students who can't travel to Inari, worlds away from the capital of Helsinki on the shores of the Baltic Sea. "Through remote access, it is also possible to discuss everyday topics with a native speaker of a language. The usage of a language becomes a natural part of everyday life," said Ljetoff. The Skolt Sámi reindeer herder observed that without the institute, "silent knowledge" and "silent culture" could have been lost, especially for students living in southern Finland.

The Skolt Sámi's use of the internet can help traditional and indigenous cultures thrive. Other modern inventions like railways, however, can irrevocably harm age-old practices. The mayor of Rovaniemi, in discussing plans for an internationally-funded Arctic Railway from his city to the north Norwegian coastline, claimed, "I think there is always a way to compromise." But this is not always possible when one form of land use may destroy the possibility for another form to continue. If the railway is built, Sámi reindeer herders will have to adapt, demonstrating once again their capacity to be far more flexible than the iron rods tied into the ground that may soon get in their way.

Mia Bennett is an assistant professor in the Department of Geography and School of Modern Languages & Cultures (China Studies Programme) at the University of Hong Kong, and editor of the Cryopolitics blog. Through fieldwork and remote sensing, she researches the politics of infrastructure development in frontier spaces, namely the Arctic and areas included within China's Belt and Road Initiative.

PIONEERING ANTARCTIC EXPEDITION: INTO THE DEPTHS OF THE FROZEN WEDDELL SEA

The Endurance *sinking in 1915 (Wikimedia Commons)*

Unprecedented International Scientific Expedition to Weddell Sea

August, 2018

AT AN EVENT HELD AT THE ROYAL GEOGRAPHICAL SOCIETY in South Kensington on April 10, 2018, it was announced that, during January/February 2019, a major international scientific expedition will explore one of the coldest, harshest and most remote locations in the world: the Weddell Sea off Antarctica. The objectives of the expedition are to survey the underside of the Larsen C Ice Shelf, document the rich and little-studied marine life of the western Weddell Sea ecosystem, and attempt to locate the wreck of Sir Ernest Shackleton's ship *Endurance*, which was trapped and crushed by the ice, and sank there in 1915.

Funded by The Flotilla Foundation – a charitable trust in the Netherlands – the Weddell Sea Expedition 2019 has a pioneering program of science and exploration planned, under the leadership of Professor Julian Dowdeswell, Director of the Scott Polar Research Institute at the University of Cambridge.

The expedition will involve an international team of researchers, consisting of glaciologists, marine geologists, marine biologists, marine biogeochemists, oceanographers and marine archaeologists from the Scott Polar Research Institute, Nekton Foundation, University of Canterbury in New Zealand, as well as the University of Cape Town and the Nelson Mandela University in Port Elizabeth, South Africa. The team will use autonomous underwater vehicles (AUVs) to survey the sea floor down to beyond 3,000 meters, study cavities on the underside of the ice shelf, and search for the wreck of *Endurance*.

The 45-day voyage will be conducted from the South African polar research and logistics vessel *S.A. Agulhas II*, owned by the Department of Environmental Affairs. Built in 2012, the vessel is one of the largest and most modern polar research ships anywhere in the world, has a wide range of science laboratories and facilities, and offers a powerful and effective platform for the multi-disciplinary research.

Antarctica has about 1.5 million square kilometers of floating ice shelves, which have been surveyed and studied from above, but only very rarely from beneath. Many of these ice shelves are thinning and retreating rapidly, making scientific investigations here very timely. The Larsen A and B ice shelves collapsed suddenly in a matter of weeks in 1995 and 2002, respectively, and one of the biggest iceberg calving events ever recorded took place from Larsen C Ice Shelf in July of 2017. Ice shelves are of particular scientific interest because they

S.A. Agulhas II

are susceptible both to atmospheric warming from above and ocean warming from below.

The Weddell Sea is one of the most pristine marine ecosystems in the world and has been nominated as a large, international Marine Protected Area. The expedition will gather vital baseline biological data on the rare and little-studied species, which inhabit this ecosystem, as well as studying the key physical processes driving changes in the region's sea ice, ocean currents and the fringing ice shelves.

Coordinating with the underwater research and survey work, Professor Wolfgang Rack and his team from Gateway Antarctica at the University of Canterbury in New Zealand, will use specially-equipped aerial drones to measure sea ice thickness and snow depth, and will also assist with the navigation of the *S.A. Agulhas II* through the pack ice in the Weddell Sea. The drone measurements will be coordinated with data from an upward-looking AUV to give a better understanding of sea ice formation.

South African researchers from the Oceanography Department of the University of Cape Town and the Nelson Mandela University will conduct oceanographic and biogeochemical work from the vessel.

Professor Dowdeswell said: "The Weddell Sea Expedition 2019 will give us an unprecedented opportunity to investigate and explore one of the most remote, and least-studied places on our planet. Ice shelves surrounding the Weddell Sea are important because they affect the mass-balance and stability of the Antarctic Ice Sheet, as well as ocean-current circulation. If ice shelves thin, break up to produce icebergs and retreat as the atmosphere and ocean waters warm, then ice flow from the interior accelerates and more mass is lost, contributing to global sea-level rise.

Melting at the base of ice shelves and calved icebergs also releases fresh water, which can inhibit the generation of very dense Antarctic Bottom Water; one of the major drivers of the thermohaline circulation of the oceans, which provides vital nutrients to major fishery grounds around the world."

The Weddell Sea Expedition 2019 hopes to inspire young people about science, engineering and technology, and the protection of Antarctica, and is partnering with the Royal Geographical Society to ensure that the expedition's research and findings are disseminated as widely as possible to schools and students in the UK, South Africa and beyond.

Excerpted from media release statement by permission.

Full access to the Reach the World Weddell Sea Expedition Journey page, can be found at explore.reachtheworld.org.

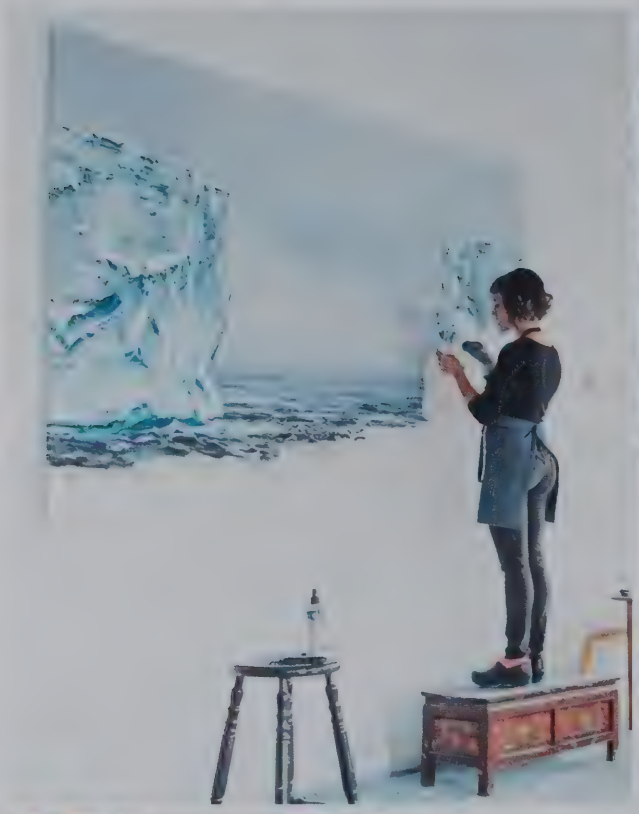
WEDDELL SEA
EXPEDITION 2019

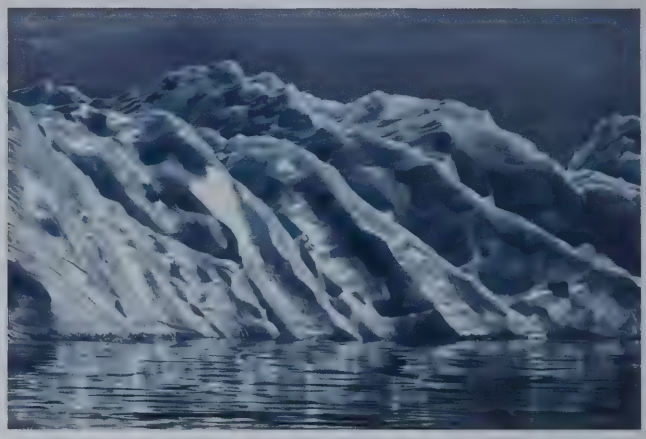
ZARIA FORMAN – CLIMATE CHANGE IN PASTEL

Jakobshavn is arguably the most famous glacier in the world. It is one of the fastest-flowing major glaciers. With speeds approaching 150 feet per day, it is roughly four times faster than it was in 1990. The glacier has thinned and retreated dramatically in the last 25 years, losing more than 100 meters of thickness over a very broad area, dumping ice into the ocean and raising sea level correspondingly. Jakobshavn creates ten percent of all the icebergs in the Atlantic, including, most likely, the one that sunk the Titanic. *The big, discrete blocks of ice in this drawing are known as seracs, and there are about 100-150 feet between each one.*

Zaria Forman
Jakobshavn Glacier, Greenland, 69° 47' 31.092"N 49° 47' 31.7076"W, 2018
Soft Pastel on Paper, 68 x 102 inches

Zaria Forman – Climate Change in Pastel





The Jakobshavn glacier is also of special significance to Forman as she shares her story: "Icebergs calve off Jakobshavn Glacier into Disco Bay, which is where I saw icebergs for the first time. Five years later, I returned to spread my mother's ashes in the same bay, on a trip she and I were planning to take together. Another five years after that, I returned with NASA to fly over Jakobshavn, experiencing the Glacier from an entirely new perspective." The NASA drawing series, to which this mural image belongs, offers a visual understanding of the changes occurring in the ice, allowing viewers to connect emotionally with places they may never have the chance to visit. They convey the beauty of these vulnerable regions, as opposed to their devastation, with the hope of inspiring viewers to help preserve them.

Zaria Forman documents climate change in pastel. She travels to remote regions of the world to collect images and inspiration for her work. She has flown with NASA on several Operation Ice Bridge missions over Antarctica, Greenland, and Arctic Canada. She has been featured on *CBS Sunday Morning*, CNN, and ABC7 *Eyewitness News*. Zaria delivered a TED Talk in 2015, and has spoken at Amazon, Google, and NASA's Goddard Space Flight Center. Her work was part of Banksy's *Dismaland* exhibition and she was the artist-in-residence aboard the National Geographic *Explorer*, in Antarctica. Her works have been featured in the *New York Times T Magazine*, *National Geographic Proof Blog*, *Huffington Post*, and *Smithsonian* magazine, among others. Forman currently works and resides in Brooklyn, NY, and is represented by Winston Wächter Fine Art in New York, NY and Seattle, WA.

To watch Zaria Forman's "Drawings that show the beauty and fragility of Earth" TED Talk, scan the QR code with your smart phone or tablet.

DARK SNOW PROJECT

by Peter Sinclair

IN 2013, DARK SNOW PROJECT INAUGURATED a bold new strategy for climate research and communication, taking a multidisciplinary international team of scientists and communicators to the Greenland ice sheet, powered by a crowd-funded Internet fundraising initiative.

In subsequent years, we've continued to show what a small group of committed individuals can achieve. In our unique enterprise, researchers and media specialists have journeyed to remote places, brought back a wealth of data, and delivered the story of a changing climate in one of Earth's most sensitive and important areas.

Jeff Goodell, a senior writer for *Rolling Stone*, who has emerged as one of the world's foremost communicators of climate science, was on the first Dark Snow expedition. Jeff flew with the team along the calving front of Ilulissat glacier (originally Jakobshavn glacier), the world's fastest flowing ice stream.

"I think about that Greenland trip a lot," Jeff told me recently, "One of the hard things to grasp about climate change is the interconnectedness of everything, that it's not just about a wildfire in California, or a flood in Miami. It's about these profound changes that are happening to our planet, in subtle, and not-so-subtle ways."

In 2017, "The Water will Come" – Jeff's book-length examination of sea level rise – became an international bestseller, an example of exactly the kind of synergy that Dark Snow's founder, climatologist-turned-glaciologist Jason Box, had in mind when hatching the idea.

I first bumped into Dr. Box at the American Geophysical Union's Fall Meeting in San Francisco – the world's largest scientific gathering, which some people have called "Burning Man for Scientists." I had the chance to interview him about his work in Greenland, and he liked the results.

In late 2012, Jason called me to see if I was interested in an idea. Based on a mention of his work in a *Rolling Stone* article,

▲ *Peter Sinclair, with GoPro camera.*
◀ *Chopper with team, from left Gabe Warren, Jason Box, Marek Stibal, Peter Sinclair, and Jonathan Ryan.*

Jason had acquired seed funding for the coming season's fieldwork, but wanted to see if he could fill his costs gap online. Because I had had some modest success using my YouTube channel to crowd-fund a trip to the Cascade's glaciers in Washington State, we agreed it would be worth a shot.

We both realized – Jason as a scientist, and I as a videographer – that a critical weakness in communicating what scientists were finding in their boots-on-the-ground research to the general public could be remedied through social media engagement. The "Dark Snow Project" was Jason's idea to address that issue.

Original inspiration came when, while on an airport layover in the record warm North American summer of 2012, Dr. Box watched people crowded around displays of wildfires burning in his home state of Colorado and beyond across North America and Siberia. He reasoned that soot and particulates from fires must be airborne, and that significant amounts settled out on the Greenland ice -- darkening the surface, which absorbs more heat, and thus adds another "feedback effect," which further speeds the melting of ice. This increase in sunlight absorption was later confirmed.[1]

The 2013 field season was my visit to Arctic, and was life-changing.

Our team also included video production lecturer from Aberystwyth University, Sara Penrhyn Jones of the UK, Marek Stibal, a PhD microbiologist now at Charles University in Prague, and, briefly, Jeff Goodell. After overcoming more than the usual delays and aforementioned logistical obstacles – inevitable in an environment as challenging as Greenland – the group returned with a trove of not only science data, but video and photographic records.

In the following years, Dark Snow has built on that initial success.

Dark Snow would evolve to include a biological X-factor... 2017 marked the publication of significant results by Dark Snow-sponsored researchers, including Dr. Stibal, ho has investigated the role of bacteria and algae in darkening the Greenland ice. In the 2013 and following campaigns, Stibal and others quantified the relationship between the increasing number of algal cells growing on the ice in response to meltwater, and the observed darkening of the surface. The effect has been found to be significant, and subsequently, larger research groups are now delving deeper into the corollary. According to Dr. Box, "We had a lot of field data," including 2000 portable spectrometer readings of surface brightness, and another 1000 biological samples, which were analyzed in Copenhagen and Prague.

Observations of surface detail have also been enhanced by the use of drones. Jonathan Ryan, a PhD candidate at Aberystwyth University in the UK, who was part of the

Core drilling

Dark Snow team in 2014 and 2015, has become known as a leader in drone use, and also published new results in 2017. Hundreds of flights over several seasons have provided data for understanding ice movement and melt.

In the meantime, Dark Snow has sparked dozens of media articles expanding awareness of the science, including pieces in *The Guardian*, *Rolling Stone*, NBC News, and even a guest appearance by Dr. Box on HBO's "Real Time with Bill Maher."

In August 2018, the Dark Snow team traveled to Greenland for its sixth season to continue this vital and unique effort to expand global awareness of Earth's most critical issue..

Science Objectives by Jason Box

While the 2013 Dark Snow Project measurements confirm how, under conditions of persistent clear skies black carbon from wildfires enhances Greenland snow melt [2], most of the darkness in approximately the lowest third of the ice sheet elevation profile (by mid summer) originates from microbiological activity.[3] With glaciologist Alun Hubbard, we plan to survey the area of our (since 2001) glaciological measurement profile at the southern tip of the ice sheet between 270 and 1100m elevation, using the fixed wing UAV after Ryan et al. (2018). Flying the UAV up and down our "Q-transect" should yield a high-resolution mosaic to give a baseline image for change detection. We're particularly interested in the damage rain does to the ice when falling copiously and when warm. The UAV-derived image is also useful to identify hazardous areas for future survey risk management.

On August 26th, Alun and I took a helicopter charter to perform maintenance on the Q-transect automatic weather stations and ice melt measurement stakes. We camped next to and walked onto the rapidly retreating Eagle Glacier.

In addition to the science:

We planted 1800 seedlings, to eventually carbon offset our tour. Of the trees that had been planted in southern Greenland in the 1960s, the tallest are now over 7 meters.

My 7-year old daughter came on the August helicopter charter to experience Greenland, and to record a video on the human/natural world connection. She plans to offer her thoughts on how we should have a more balanced, reciprocal relationship with Nature. We need to take and consume less. Other children will be her main audience. Through this medium, we believe children may influence their parents who need to appreciate Nature more for the many resources she provides.

Peter Sinclair is an independent videographer specializing in climate change and renewable energy solutions. His series of YouTube videos: "Climate Denial Crock of the Week," the blog by the same name, and "This is Not Cool" – a collaboration with Yale Climate Connections – have received millions of views, are used in higher education and university settings around the planet, and have become trusted resources for scientists, educators, students, policy makers, and citizens. Mr. Sinclair is winner of the "Friend of the Planet" award from the National Center for Science Education. As Media Director of the Dark Snow Project, a crowd-funded, international Science/ Communication initiative, Mr. Sinclair continues to travel with and interview leading scientists in all fields related to climate change.

Dr. Jason Box has been investigating Greenland ice sheet sensitivity to weather and climate as part of 25 expeditions to Greenland since 1994. His time camping on the inland ice exceeds one year. Year 2012 brought a deeper level of insight as scientific perspective shifts toward examining the interactions of ice with atmospheric and ocean systems, including the role of fire on darkening of the cryosphere. As part of his academic enterprise, Box has authored or co-authored 100+ peer-reviewed publications related to Greenland cryosphere-climate interactivity. Box taught climatology courses at Ohio State University 2003-2012. Box is now a professor at the Geological Survey of Denmark and Greenland (GEUS). He was a contributing author to the Nobel Peace Prize-winning Intergovernmental Panel on Climate Change Fourth Assessment Report. Box is also the former Chair of the Cryosphere Focus Group of the American Geophysical Union.

1. http://www.pnas.org/content/111/22/7964
2. Stibal, M., J. E. Box, K. A. Cameron, P. L. Langen, M. L. Yallop, R. H. Mottram, A. L. Khan, N. P. Molotch, N. A. M. Chrismas, F. Calì Quaglia, D. Remias, C. J. P. P. Smeets, M. R. van den Broeke, J. C. Ryan, A. Hubbard, M. Tranter, D. van As, A. P. Ahlstrøm 2017. Algae drive enhanced darkening of bare ice on the Greenland ice sheet. Geophysical Research Letters, 44. doi. org/10.1002/2017GL075958
3. Ryan, J.C., A. Hubbard, M. Stibal, T.D. Irvine-Fynn, J. Cook, L.C. Smith, K. Cameron, and J.E. Box, Dark zone of the Greenland Ice Sheet controlled by distributed biologically-active impurities, https://www.nature.com/articles/s41467-018-03353-2

Mission

The Dark Snow Project gathers 'hard numbers' from the Arctic to quantify the distant snow/ice melting impact of industrial and wildfire black carbon soot; mineral dust; and microbes, each melt factor having some human driven enhancement.

We bridge science and the public by engagement through web video, blogs, TV, film, online/print media, and public speaking. To inspire, especially the next generation, we present science in its adventurous and noble form. Our media products are a form of "edutainment" or "scientainment." We not only gather data and but analyze it to check global model calculations/projections and develop baseline climate data records. We target publication in top core scientific journals. We invite the science and art communities to use the Dark Snow brand to amplify their message. We showcase excellence at darksnow.org. We lead thinking by getting ahead of the slow and rigid conventional funding system through crowd-funding and foundation support.

DARK SNOW

DARK SNOW

Dark Snow Project Field Season, 2018 (YouTube video).

Jason Box, left, with Rolling Stone's Jeff Goodell.

Since magazines can't come with music soundtracks, we offer the next best thing (use your QR-code reader).
The Polar Times is pleased to present
composer, multimedia artist, editor, author, and creator of "Arctic Rhythms" and "Terra Nova: Sinfonia Antarctica"

PAUL D. MILLER AKA DJ SPOOKY

"You need to be open to everything. I see imagination as something that can be really useful as a tool to get people to think another world is possible. Imagination is the ultimate renewable resource." ~DJ Spooky

Photo credit: Tobin Poppenberg

SCIENCE AND DIPLOMACY

by Raymond Arnaudo

Submitted March, 2017

THANKS TO MANY SUCCESSFUL AND ROBUST international cooperation initiatives in Antarctica, the Frozen Continent rarely makes news, which focuses so often on international conflicts. But the growing importance of Antarctica to climate change and to global science and environment issues prompted a dozen international experts from differing areas of expertise to discuss new challenges in a week-long seminar aboard an Antarctic cruise liner, the *Akademik Ioffe*, in 2016. I was fortunate to join them.

The Forum, held from February 28 to March 9, provided an opportunity to review the current efforts and successes of the organizations presently collaborating on the protection and conservation of this unique environment: the Antarctic Treaty, its Protocol on Environmental Protection,and the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), informally known as the Antarctic Treaty System (ATS). Environmentalists and representatives from the tourist and fishing industries come together to discuss the future management of human activities in Antarctica. By the end of the week at sea, we had identified several concerns and made multiple recommendations for future action. We also agreed to formalize continuing discussions under the banner of the Future of Antarctica Forum.

The Forum, which involved the participation of individuals from a range of Antarctic stakeholder groups, noted that the Antarctic Treaty System needs to evolve in the 21st century. Increasing and enhancing the use of the scientific data and information available to assist decision-making and ongoing, improved cooperation and coordination among all stakeholders will be essential to ensuring that Antarctica remains a continent of peace, science, and conservation. It is increasingly important for Antarctic science, management, and diplomacy to focus on the problems of climate change, overutilization of marine resources, and the increasing stress of the growing number of tourists to the continent, especially on the Antarctic Peninsula. Participants agreed that future policy decisions would be significantly aided by an interdisciplinary, international effort to "distinguish the direct and interactive effects of climate change, fishing, tourism, and national operations on ecosystems in the Antarctic Peninsula region for improved environmental management." Specifically, participants suggested that Oceanites, the nongovernmental organization that convened the trip, pursue development of a project along these lines, working with relevant stakeholders in the collaborative spirit of the Antarctic Treaty System.

The group met daily during the ten-day trip, under Chatham House Rules—that is, no attribution by name or affiliation, which generally promotes a freer range of discussion. Indeed, this freedom allowed a healthy exchange of views on the successes and problems facing the ATS. For example:

The average temperatures on the Peninsula have risen about 5 degrees Fahrenheit over the past 50 years, clearly indicating a warming trend. Ensuring that human activities in this region are managed in a way that does not exacerbate climatic stresses on the ecosystem is crucial.

What can be done to raise Antarctica in the 'global forum of discussions on current topics such as climate change?

Is ATS decision-making supported adequately by the science?

Are fishing interests properly managed? Is tourism managed as well as possible? The participants concluded that the broad principles expressed in the landmark international agreements governing Antarctica,ATS,had been successful in the governance and environmental protection of the Antarctic to date, but that new and emerging challenges required changes.

The Antarctic Treaty has grown from the 12 original signatories in 1959 to 53 today, comprising over two-thirds of the world's population. Of its members, 30 maintain active research programs, and are referred to as Consultative Parties, or voting members. CCAMLR has grown from 14 signatories in 1959 to 36 today, of which 24 (and the European Union) are Commission members. The Consultative Parties and Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) members focus on increasing and enhancing the use of the scientific data and information available to assist decision-making, and improved cooperation and coordination among all stakeholders. Such engagement will be essential to ensuring that Antarctica retains its status as the continent of peace, science, and conservation.

The key roles of Antarctic science, management, and diplomacy in addressing climate change emerged as a central theme of the discussions. In the context of broader overall changes across the Antarctic and Southern Oceans, the notable warming trend in the western Antarctic Peninsula, and its implications for the global ecosystem, was identified as a major concern. The average temperatures on the Peninsula have risen about 5 degrees Fahrenheit over the past 50 years, clearly indicating a warming trend. Ensuring that human activities in this region are managed in a way that does not exacerbate climatic stresses on the ecosystem is crucial. Participants agreed that future policy decisions in this regard would be significantly aided by an interdisciplinary, international effort to seek to:

"Distinguish the direct and interactive effects of climate change, fishing, tourism, and national operations on ecosystems in the Antarctic Peninsula region for improved environmental management."

Forum participants noted the relevance and success of Oceanites Antarctic Site Inventory project, which, over the past 40 of these sites—generally the most visited ones—which has encouraged global cooperation in observing environmental changes at these

specific locations.

Forum participants encouraged all Parties to the Treaty and nongovernmental organizations, like Oceanites, which has played a key role in the Inventory, to continue working together in the collaborative spirit of the Antarctic Treaty System. These collaborations help maintain baseline data in parts of Antarctica, the importance of which cannot be overemphasized.

On the subject of tourism, Forum participants noted that tourist landings from cruise ships had increased from 7,000 in the early 1990s to over 35,000 in 2014. There was general agreement that the onshore landings had been generally well monitored,and that no significant impacts have raised concerns at this time. Still, the presence of growing numbers, concentrated in a limited number of areas with good access, needs to be monitored.

With regard to fishing efforts, several participants expressed concern that CCAMLR needed to be vigilant regarding increased stresses on marine resources. CCAMLR was negotiated in the late 1970s to address the unregulated fisheries in the Southern Ocean, which had resulted in the decimation of several species of Antarctic fish. While there was broad agreement that the Treaty has been successful in controlling overfishing, Forum participants urged countries to continue to focus on Article 2 (3) of CCAMLR. Specifically, that means adhering to this principle of conservation: "prevention of changes or minimisation of the risk of changes in the marine ecosystem which are not potentially reversible over two or three decades."

The consideration of ecosystem management in determining harvest levels, as opposed to sustainable yield, or maximum phausia superba) in 1982. Once CCAMLR entered into force, overfishing was controlled. Current catch levels of krill are more in the range of 200,000 MT. Catches of toothfish (Dissosthicus eligoinides),also known as Chilean Seabass, a prized deep sea fish, had peaked at levels over 15,000 MT in 1999, but are now consistently below 12,000 MT.

Predicted catch levels of the start of fishing seasons are consistently much higher than actual catches, indicating a large capacity to expand, should harvesting techniques and market interest permit, which demonstrates the need for continued vigilance. Some participants in the seminar expressed concern at the growth of the new entrants to the Antarctic fisheries,such as China,and urged CCAMLR members to continue to observe its conservationist principles. As noted, CCAMLR was the first international agreement to recognize the concept of "ecosystem management," and it remains an example of the need to focus on the entire ecosystem, rather than simple fisheries management and maximization of catches. In addition, the diffculty of inadequate monitoring and enforcement in these distant waters remains a problem.

DoD photo by Petty Officer 2nd Class John K. Sokolowski, U.S. Navy.

Forum participants suggested that the outcomes of such work would further provide Antarctic Treaty Parties with the best possible scientific data and information to inform evidence-based decision-making. Moreover, public communication of the outcomes would help improve global understanding of the role of Antarctica in the climate system, of the impacts the region is already experiencing, and the work being done through the Antarctic Treaty System to mitigate these impacts. There was broad agreement that CCAMLR was continuing to provide the appropriate forum for managing the marine resources of the Southern Ocean.

Next Steps

Oceanites accepted the challenge of continuing to host future meetings of the Future of Antarctica Forum and of establishing an international interdisciplinary effort to bring together available scientific, tourism, and fisheries data for the Antarctic Peninsula region, in an attempt to distinguish the direct and interactive effects of climate change and other human activities on the ecosystem. Forum participants agreed to support Oceanites in this work, as appropriate. They also expressed their hope that other Treaty parties would also agree that such a project would be useful, and to share any requested data as far as possible.

The Forum represents yet another successful meeting of minds, organizations, and governments in an attempt to protect the frozen continent and responsibly leverage its vast resources and potential.

Raymond Arnaudo is a senior scholar at the American Association for the Advancement of Science (publisher of *Science & Diplomacy*). He has more than thirty years of experience in international environmental and science policy affairs, with a focus on the polar regions, at the U.S. Department of State.

CCAMLR

ARCTIC DESIGN GROUP ON MEDIATING ENVIRONMENTS

by Matthew Jull

THE ARCTIC DESIGN GROUP (ADG) WAS LAUNCHED IN 2013, at the University of Virginia School of Architecture as a multi-disciplinary platform for Arctic-focused research, encompassing the UVA School of Architecture, Department of Environmental Sciences, and the Law School. It is the first of its kind in the U.S. and one of only a handful of efforts worldwide to bring to the foreground design – in combination with social sciences and humanities – as a method of proactively developing strategies and proposals for the future of northern territories.

The Arctic is a place where tension between the rendered and the experienced is arguably at its highest. Extreme cold climate conditions coupled with prospects and anxieties afforded by the impacts of climate change are often the dominating narratives shaping the discourse about the region. The loss of sea ice, the thawing of permafrost, the release of methane gas, and the displacement of species, peoples and towns are only a handful of examples that are profoundly impacting the future of the Arctic. Simultaneously, the climatic shifts are helping to unlock the grips of a deep freeze and opening up new economic, political, and urbanistic opportunities. Nations are posturing for control of this territory. Global trade routes are bending north, and extractive industries and supporting infrastructures are gravitating towards the increasingly accessible and geopolitically strategic Arctic Ocean and adjacent lands. Caught in amidst these transformations is our capacity to soberly reflect, inflect and steer the narratives of the region as a lived place that is both animated by and actively sculpting its physical and material landscapes.

Over the past decade there has been an explosion of meetings, conferences, festivals, and symposia focused on the Arctic with stakeholders ranging from governments and private sectors to NGOs and

Full Spectrum Symbiosis: Yue Han, Xinxin Huang, Han Yu, Arctic Design Group, 2017.

Unversities. The eight Arctic nations – Canada, Finland, Greenland (Denmark), Iceland, Norway, Russia, Sweden and United States – are enacting plans for their northern territories and developing strategic policy frameworks through the Arctic Council, for instance. Other countries are also getting involved by securing partnerships in research or economic development with the Arctic nations.

Despite this growing interest in the region, there are only a handful of architects, landscape architects and urban designers who are currently engaged in fundamental research on design and planning of Arctic communities,[1] while the majority of the Arctic research is formulated from the perspectives of science, economics, and policy. As the global forces of change are becoming more pronounced in the Arctic, the future trajectories for living environments, city-making processes and their adaptive capacities are brought into question and need to be addressed directly. Concurrently, the Arctic as a region of negotiation

Arctic Design Initiative exhibition; Arctic Design Group, Elmaleh Gallery, UVA School of Architecture, 2013: supported by UVA Center for Global Inquiry and Innovation; Dimitra Grigoriou, Bryce Vogel, Arctic Design Group.

As the global forces of change are becoming more pronounced in the Arctic, the future trajectories for living environments, city-making processes and their adaptive capacities are brought into question.

between the built and natural environments offers numerous lessons for design both within and beyond the polar territories. At the intersection of material, cultural, environmental and technological dimensions, the Arctic is a catalyst for rethinking the mechanisms of built environment from the scale of building and infrastructural components to that of cities. It is also a prime testing ground to develop more culturally and environmentally attuned design approaches to address the impacts of climate change.

By actively foregrounding design in the contemporary Arctic discourse through their teaching, research, and practice, *Arctic Design Group*, founded by UVA School of Architecture assistant professors, Leena Cho and Matthew Jull, seeks productive engagement with a wide range of disciplines and northern communities to highlight and bring much needed attention to the Arctic inhabitants, their everyday living environments and cultural practices. Their forthcoming book, *Arctic Cities + Mediated Environments* (ORO Applied Research & Design, 2019), presents renewed design approaches and opportunities in the North and envisions alternative futures for the long-term sustainability of the region.

Arctic Cities + Mediated Environments offers techniques of design synthesis and visualization, such as mappings, charts, photographs and texts, to position the region as a dynamic and multivalent territory shaped by the intersecting flows of climates, materials, and people. It provides novel concepts and design-driven research on environmental systems, morphologies and processes framed by the various living, abiotic and phenomenological agents catalyzed by the unique climate in this region. Essays by eight invited design scholars, including David Garcia, Geoff Manaugh, Lola Sheppard and Mason White, provide diverse perspectives on the design of the built environment in the Arctic and remind us of the unique expertise the design brings –the interface between the human and the environment. Finally, the book features propositions addressing four key design challenges many Alaskan communities face – legacies and practices surrounding house, ground, school, and land – and probes the underlying assumptions, overlooked opportunities, and misplaced priorities in design within a parallel framework of climate change and extreme environment. The sampled projects reveal existing issues many Arctic communities face and call out the importance of human agency, autonomy and adaptability in the making of resilient Arctic communities.

Arctic Design Group (ADG) is a research platform founded by Leena Cho and Matthew Jull at the UVA School of Architecture that is focused on developing design strategies for buildings, cities and landscapes in extreme environments and to address challenges faced by the rapidly changing Arctic region. Funded by grants from the National Science Foundation, the Jefferson Trust, the Graham Foundation, the Rotch Foundation, the UVA Environmental Resilience Institute, the Center for Global Inquiry and Innovation, the Anchorage Museum, and more, ADG is engaged in research collaborations throughout the arctic, and in teaching travelling design studios, seminars and workshops. They have been invited to present and feature their work in publications, exhibitions, symposia, and lectures in Russia, Canada, Norway, Iceland, Finland and Alaska.

Matthew Jull, PhD, is an Assistant Professor of Architecture at UVA. His research explores the potentials of architecture and urban design within the frame of extreme climates and the increasing friction between the built environment and the forces shaping our planet. With a background in geophysics and architecture, his work investigates the intersection between energy, thermodynamics, culture, technology, and environment in the Arctic. He has written extensively on the work of architect Ralph Erskine and the design and construction of Arctic cities in the former Soviet Union. Jull received his M Arch from Harvard University's Graduate School of Design and his PhD in geophysics from Cambridge University; prior to joining UVA, he was an architect and project leader at OMA/Rem Koolhaas in Rotterdam, NL.

Leena Cho is a landscape urbanist and Assistant Professor of Landscape Architecture at UVA. Her research focuses on the varying conceptions, representations, and instrumentality of weather and climate in biophysical environments of cities. Leena's work engages directly with landscape-specific concerns in Arctic cities and towns where frigid weather and amplified effects of climate change reveal new challenges and design possibilities for urban infrastructure, public spaces, and management. She received her MLA, with distinction, from Harvard University's Graduate School of Design, and has practiced as a landscape architect at MVVA (USA), and Maxwan Architects and Urbanists (NL).

Pre-sales book link:
http://appliedresearchanddesign.com/book/arctic-cities-mediated-environments

1. Synthesis of historical and cultural narratives as it relates to northern design: Sheppard, L., & White, M. (2017). *Many Norths: Spatial practice in a Polar Territory.* Actar, New York; Larsen, J. K., & Hemmersam, P. (Eds.). (2018); *Future North: The Changing Arctic Landscapes.* Routledge, London.

INTRODUCTION TO THE ARCTIC YOUTH AMBASSADORS PROGRAM

by Maka Monture Päki

US Arctic Youth Ambassador Program Coordinator, Anchorage, AK

U.S. Secretary of State John Kerry and U.S. Secretary of the Interior Sally Jewell pose for a photo with members of the Arctic Youth Ambassador Program at the welcome reception for the Global Leadership in the Arctic: Cooperation, Innovation, Engagement, and Resilience (GLACIER) Conference, at the Anchorage Museum in Anchorage, Alaska, on August 30, 2015. Photos above, and at right, courtesy of State Department Photo/Public Domain.

ORIGINALLY ESTABLISHED by the U.S. Fish and Wildlife Service and the U.S. Department of State, in collaboration with nonprofit education partner Alaska Geographic, the Arctic Youth Ambassadors Program brings together diverse youth from across Alaska to serve as ambassadors for their communities and country in building awareness at home and abroad about life in the Arctic.

In Fall 2017, a new cohort of Arctic Youth Ambassadors in Alaska was recruited to work with the Arctic Council's Conservation of Arctic Flora and Fauna Working Group, which is chaired by the United States as Finland assumes leadership of the Arctic Council.
Photo courtesy of Maka Monture Päki

The inaugural cohort served for a term of two years, which coincided with the U.S. Chairmanship of the Arctic Council from 2015-2017. During this time, the Youth Ambassadors shared both their priorities and local perspective on Arctic issues as well as new knowledge they gained while engaging with partners and leaders from around the world. They added their voices and solutions to a global conversation on how to best support and sustain communities, cultures and the environment in a changing Arctic.

In Fall 2017, a new cohort of Arctic Youth Ambassadors in Alaska was recruited to work with the Arctic Council's Conservation of Arctic Flora and Fauna Working Group, which had been chaired by the United States as Finland assumed leadership of the Arctic Council.

Arctic Youth Ambassadors continue to participate in programs and meetings across Alaska, in other states, and as far as Norway, Iceland, and France. Through interviews, media coverage, and blogs, their stories are spreading far and wide, which serve to not only raise awareness about transitions in the Far North, but to also inspire greater public involvement.

Changes in the Arctic did not happen overnight. In a rapidly altering world, many of the challenges the region is facing cannot be easily solved. Younger generations will play an important role in addressing these issues. As knowledgeable representatives who truly understand the Arctic and its people, the Arctic Youth Ambassadors are uniquely qualified to offer their distinctive perspective in discussions with their peers across the United States and around the world.

ARCTIC YOUTH AMBASSADORS

Additional support for 2018 is provided by GCI Alaska and the World Wildlife Fund.

For more info:
www.arcticyouthambassadors.org

Contact:
mmonture@alaskageographic.org

Follow the Arctic Youth Ambassadors and their stories on social media by tracking #ThisArcticLife #USArcticYouth

ADVENTURE CANADA

Mike Strizic
Marketing Coordinator

The Power of Place: A Case for Intergenerational Travel

ADVENTURE CANADA has always been a family business. So, it is no surprise that our trips attract travelers from every generation. We've had passengers as old as 95, and as young as four months, aboard our ships. We offer substantial incentives to young travelers, to make it easier for younger and older family members to experience our tours together. But is intergenerational travel actually effectual? And what does it feel like to travel to remote areas as a family unit?

To get to the heart of these questions, we chatted with eleven-year-old Josh DeBortoli—and his grandmother Rita—who both joined us on a 14-day expedition aboard an ice-class ship from Greenland to the Canadian Arctic and back.

Travel is Together

"One of my mother's bucket list items was to see glaciers and icebergs in the Arctic," says Karen DeBortoli, Josh's mother and Rita's daughter. "She saw Adventure Canada on the Discovery Channel [on *Mighty Cruise Ships*] and said 'I have to do that.' When she showed it to Josh, he thought it looked cool—and that's how he ended up in the Arctic!"

For Josh, this was an opportunity to spend quality time with his grandmother and form lifelong memories. It was a chance to go somewhere where both of them—despite their different ages—could explore the region for the first time. Such pursuits are increasingly rare in our modern, interconnected world, but the Arctic levels the playing field. The educational, cultural, and adventure components sweetened the deal. "Josh and my mother have always been close," says Karen, "but this was a whole new thing for them." For her part, Rita was overjoyed to have her grandson around on the ship: "I've wanted to travel with him—and just him—for a long time. It brought us even closer together." Josh agrees that sharing experiences increases the thrill: "the best part of traveling with my gram was seeing the animals together."

Travel is Change

Adventure Canada emphasizes the definition of being a traveler rather than a tourist. Travelers seek to be changed by the places they visit, and that means facing challenges. Simply setting out on an adventure can be the hardest part—for older and younger travelers alike. "This was Josh's longest trip away from home," says Karen. "At first, we thought that he'd be homesick. But whenever we got a call from the ship, I could tell that we were the furthest thing from his mind! All he could talk about was the incredible things he was seeing."

"Josh's experience is typical," says Cedar Swan, Adventure Canada's CEO. "We encourage people to push themselves. On each trip, I see travelers overcome obstacles and achieve feats they thought were long since beyond them, whether that's a thrilling Zodiac ride, a hike on the tundra, or simply being on a ship! It's one of the most rewarding parts of my job." Coincidentally, the Zodiac rides—and the seals that popped up during the excursions—were some of the highlights of Josh's trip. When talking about

Images courtesy: Adventure Canada

their experience together, Rita explained that the necessary flexibility of travel in the North had given her the opportunity to observe her grandson learning to deal with change, showing poise and maturity beyond his years.

Karen noted that her son and mother had shared an adventure that immeasurably deepened their bond. The years between them had fallen by the wayside as a result of their joint travel experiences. "There's this shorthand between them now. They were able to spend all this quality time together, and my mother got to see different sides to her grandson on this trip. That was really meaningful for them."

Rita remarked that traveling to the Arctic with Adventure Canada exposed Josh to a culture and environment unlike any he had ever experienced before, and that the transformation in her grandson was swift and pronounced. "He was like a sponge," she says, "he soaked up everything. There wasn't a thing he didn't like." She added that travel through Canada's Arctic provided the invaluable opportunity to engage in challenging conversations with Josh about conservation, social change, and sustainability. "His whole perspective changed in the North," she told us. "At first, when I'd speak with him about developing a social conscience, he'd blow me off: 'But I'm only eleven,' he'd say." But soon, Josh was opening up and asking probing questions about the new world he was seeing. "He wanted to know why [northern communities in] Greenland seemed to have so much more [than those in Canada]. He was floored by the inconsistencies in how different nations treat the North and its people. He wants to learn more and see that change."

Travel is Being Present

When we travel, we open ourselves to new experiences, cultures, and challenges. Wherever this transference occurs collectively between generations, magic happens. We see how the innocence of youth, or the wisdom of age is brought to bear on the journey's impact. "One of my favorite aspects of being really present while traveling is sharing

adventures with my children," says Cedar. "I was raised on ships in the Arctic, and being able to pass on that wealth of experience is so special."

Cedar's daughters Charlotte (5) and Islay (2) have both chalked up life experiences that are the envy of even the most seasoned travelers. They've sailed the Northwest Passage, along the Labrador coast, and beyond. For Cedar, it is about sharing intimate and impactful moments with her children: "They show me things that I might miss," she says. "I love to slow down and watch them marvel at the color of a rock, or the Arctic plants blooming in summer. It's also amazing to help the girls take pride in their Inuit heritage!" The children, in turn, continually build up their confidence and resilience through the shared adventure. "I like riding the Zodiacs!" says Charlotte.

For Josh, travel meant coming out of his shell—in a big way. After a few days aboard the ship, he was walking up to people at dinner, introducing himself, and striking up conversations. "He was a bit of a celebrity aboard," she laughs. "He spent a lot of time with the staff, he wanted to learn *everything*. I've never heard anyone ask so many questions!"

Finding a Path

For some, travel can be true calling. This is especially evident in the young. "I was fourteen when I visited the Arctic for the first time," says Cedar, "and now I go every year. This place completely changed my life." Cedar runs her family's business operation and has helped usher Adventure Canada into the 21st century. The company has been named USA Today's Best Adventure Cruise Line, received Trip Advisor's 2018 Certificate of Excellence, and Cedar herself has been named one of *Canadian Traveller's* Top 40 Under 40.

"It all starts with the magic of experiencing a new place," she says. "When we share our planet's treasures with our children, it enriches us, too." Cedar established a program where Adventure Canada travelers under the age of 30 can save 30% on the cost of their trips. "Anything that can get multiple generations traveling together—to really feel that magic—is what we need to be doing."

What's next for the DeBortolis? "I want to go to Africa on safari," says Josh, who is also interested in participating in the annual Students on Ice Arctic expedition, inspired by his recent Adventure Canada experiences.

The Importance of Stewardship

When we encourage our children to explore widely and deeply, we are sowing the seeds for a future that values culture, connection, and the environment. There is no better way to impress the importance of our planet's wild spaces upon the next generation than to immerse the children in it. Adventure Canada partner, Students on Ice, does just that each year with their Arctic expedition. Aboard the *Ocean Endeavour*, youth from around the world join luminaries and leaders—including Adventure Canada staff—for a voyage that seeks to broaden horizons across the board. Intergenerational travel carries the power to catalyze personal growth, inspire sustainability initiatives, and ultimately effect positive change in communities all around the world.

"Adventure Canada is very much aligned with the idea that true stewardship occurs when people are passionate about place," says Cedar. "We do everything we can to make sure that passion is given a place to flourish. When we travel with local Inuit culturalists, we know that our young passengers will take their teachings to heart. When we travel with regional experts, we understand that our travelers of all ages will be learning skills and gathering knowledge that they will take home with them, and educate others."

Karen DeBortoli shares this sentiment and notes that Josh quickly forgot his timid side and embraced the power of the North. "He talks about watching a polar bear eating a seal with an excitement I couldn't even believe! And when he got home at 2:00am, he wouldn't go to bed until he had shown us every one of the thousands of photos he'd taken."

Rita tells us that Josh still hasn't stopped talking about the Arctic, and is now hard at work recruiting others to join him on further adventures. "It was a truly transformative experience for him; he's always looking for the next trip."

Courtesy of adventurecanada.com

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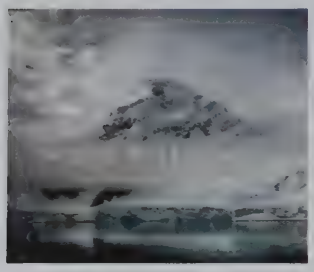
White Wilderness: The Antarctic Peninsula

by Rick Burritt

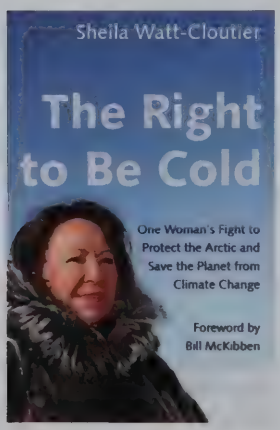


White Wilderness: The Antarctic Peninsula is a photographic adventure through some of the most magnificent, pristine and raw landscapes on earth. Stunning and mysterious, Rick Burritt's images intimately reveal the Antarctic landscape on a journey from Ushuaia, Argentina, across the churning seas of the Drake Passage to the calm, protected waters of the Antarctic Peninsula. Deception Island, the penguin colonies of Port Lockroy, Gonzalez Videla, Hanna Point and Livingston Island, and the breathtaking Neumeyer and Lemaire Channels are all represented in this beautiful, 120-page, exquisitely printed art photography book.
https://rickburrittphoto.com/products/white-wilderness-signed-edition-20-will-be-donated-to-charity

The Right to Be Cold

by Sheila Watt-Cloutier

A "courageous and revelatory memoir" (Naomi Klein) chronicling the life of the leading Indigenous climate change, cultural, and human rights advocate.


Sheila Watt-Cloutier
The Right to Be Cold
One Woman's Fight to Protect the Arctic and Save the Planet from Climate Change
Foreword by Bill McKibben

The Right to Be Cold is Sheila Watt-Cloutier's memoir of growing up in the Arctic reaches of Quebec. It is the human story of life on the front lines of climate change, told by a woman who rose from humble beginnings to become one of the most influential Indigenous environmental, cultural, and human rights advocates in the world.

"Sheila Watt-Cloutier's personal stories put a cultural face and human voice on climate change, connecting the reader through her passion and heart. She gracefully communicates the ethical imperative that encourages the move from understanding to action. I am indebted to her for making this issue come alive for people through this remarkable book." *—Will Steger, polar explorer, author, and founder of Climate Generation: A Will Steger Legacy*
https://www.upress.umn.edu/book-division/books/the-right-to-be-cold

Arcticness: Because It Is Home

by Ilan Kelman

Climate change and globalization are opening

up the Arctic for exploitation by the world – or so we are told. But what about the views, interests, and needs of the peoples who live in the region? What about the myriad of other factors affecting the Arctic and its peoples? This book explores opportunities and limitations in engaging with the Arctic under change, and the Arctic peoples experiencing the change, through the lens of understanding Arcticness: what the Arctic means to Arctic peoples socially and physically. The chapters bring together a variety of disciplines, such as law, politics, geography and the arts, to examine what Arctic peoples could learn from and teach elsewhere, across disciplines and across locations. The authors reflect on philosophies of change in tandem with philosophies of the Arctic, particularly as represented by everyday experiences, memories and geographical imaginations.

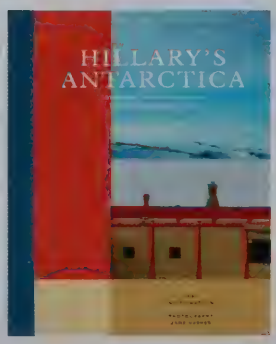
Ilan Kelman is Reader in Risk, Resilience and Global Health at UCL and a researcher at the University of Agder, Kristiansand, Norway. His overall research interest is linking disasters and health, including the integration of climate change into disaster research and health research. Find out more about his research at www.ilankelman.org and on Twitter at @IlanKelman

Hillary's Antarctica

by Nigel Watson and Jane Ussher

Written by Nigel Watson of the Antarctic Heritage Trust, and illustrated with Jane Ussher's stunning photographs, historic images and never-before-seen ephemera, this is the first book to fully document and celebrate the contribution Sir Edmund Hillary and the New Zealand team made to Antarctic history, and the legacy they left behind.

Hillary and the team were primarily a support act to the British Commonwealth Trans-Antarctic crossing party. By heading on to the South Pole and reaching it before the crossing party, Hillary created tensions, unleashed a media storm and achieved an historic first overland to the South Pole. Hillary even had the audacity to succeed using three farm tractors. The epic journeys of this expedition added another fascinating chapter to the exploration annals of Antarctica. Hillary and his team laid the foundations for New Zealand's continuous, and increasingly important, presence in Antarctica.



NEUTRINOS POINT THE WAY TO COSMIC RAYS

Astronomers Identify Source of Cosmic Rays Using Neutrinos and Gamma Rays

by Michael Lucibella
Antarctic Sun Editor, *The Guardian*,
Posted July 12, 2018

USING DATA GATHERED by the National Science Foundation(NSF)-funded IceCube Neutrino Observatory at the South Pole, scientists have for the first time identified a super massive black hole as the source of some of the highest energy cosmic rays. In a pair of papers published in the July 13 edition of *Science*, astronomers reported that working in conjunction with ground-based and space-based gamma ray telescopes they were able to pinpoint a supermassive black hole at the heart of a distant galaxy as the source of two neutrino emissions that also produced extremely energetic cosmic rays.

"DISCOVERY MAY SOLVE 100-YEAR-OLD PUZZLE OF HIGH-ENERGY COSMIC RAYS THAT OCCASIONALLY HIT EARTH"
– The Guardian, July 12, 2018

It's the first time astronomers have been able to definitively pinpoint an astronomical phenomena powerful enough to accelerate charged particles up to some of the highest energies ever detected, more than a million times more energetic than the best man-made particle accelerators.

"We don't know where they are produced, how they are accelerated," said Francis Halzen, a University of Wisconsin-Madison professor of physics and lead scientist for IceCube. "This is probably the oldest problem in astronomy."

That the detection was confirmed by other instruments, including an orbiting telescope operated by NASA, is a demonstration of the value of the emerging field of "multi-messenger astronomy," which describes the ability to marshal instruments globally to make and verify discoveries by combining data from messenger signals that reveal information about the universe.

"The era of multi-messenger astrophysics is here," said NSF Director France Córdova. "Each messenger – from electromagnetic radiation, gravitational waves and now neutrinos – gives us a more complete understanding of the universe, and important new insights into the most powerful objects and events in the sky. Such breakthroughs are only possible through a long-term commitment to fundamental research and investment in superb research facilities.

"Scientists have known about cosmic rays since 1912, but pinpointing their origin is difficult. The term "cosmic rays" is a bit of a misnomer. They are in fact charged particles with tremendous amounts of energy that speed through the universe at high speeds. This charge, which allows them to be accelerated to their incredible energies, also means they are deflected by the magnetic fields that permeate the universe, making it impossible to trace their paths back to their origins.

Neutrinos, ghostly particles with nearly no mass that travel at almost the speed of light, are neutral and aren't affected at all by magnetic fields. Scientists can trace their paths directly back to their source. Likewise, gamma rays, essentially a kind of high-energy light, also travel through the universe unperturbed by magnetic fields. Neutrinos, gamma rays and cosmic ray particles are produced in the same powerful nuclear reactions so likely where one originates, so do they all.

"We [are] looking at the first source of not only high-energy gamma rays but also neutrinos, and that means that this source is also [a] source of cosmic ray particles," said Albrecht Karle, another UW-Madison physics professor and senior IceCube scientist.

NSF's Office of Polar Programs, which manages the U.S. Antarctic Program, and the Physics Division in its Mathematical and Physical Sciences Directorate jointly oversee the operation of the NSF's IceCube, the world's largest neutrino detector.

Located at NSF's Amundsen-Scott South Pole Station, the observatory was designed specifically to observe and track high-energy neutrinos. A neutrino barely interacts with normal matter and can pass through many miles of solid material completely undisturbed. However, if on the rare occasion it precisely strikes the nucleus of an atom, it will emit a tiny flash of light. IceCube has 5,160 sensitive light detectors buried under more than a kilometer of clear ice at the South Pole, using a square kilometer of natural ice itself a detection medium to track the energy and direction of neutrinos.

Though highly sophisticated, the neutrino observatory was only the first part of the story.

The researchers hailed this discovery as a big success for "Multi-Messenger Astronomy" an emerging field of astronomy that uses multiple telescopes and different methods to observe the sky to learn as much as possible about an astronomical event.

"This is the first event that is really multi-messenger," Halzen said. "This whole episode would not have happened without multiple telescopes. Every telescope individually would have missed the event."

On September 22, 2017, IceCube detected a high-energy neutrino passing through the ice at the heart of the detector.

"The event that triggered this was a beautiful event," Karle said, adding that they were able to track the neutrino for more than a kilometer, about 2,000 meters under the ice. "That is like the sweet spot, it's a perfect condition."

Within 43 seconds, the observatory's computer calculated the particle's track

As the neutrino passed through the ice below the South Pole on September 22, 2017, it emitted a faint trail of light along its track, which IceCube's detectors picked up (not to scale).

and the general direction in the sky it came from and sent out an alert out to telescopes around the world to train their eyes on a particular set of coordinates in the sky.

"We then sent the coordinates, with an astronomical telemetry to all the telescopes, and then they looked at the direction that we pointed them and that's how we converged on this galaxy," Halzen said.

The point on the sky the neutrino came from was a distant galaxy named TXS 0506+056. It's a galaxy about 12 billion light-years away with an active, enormous supermassive black hole at the center of it. The black hole is what astronomers call a "blazar" because the area around its event horizon emits enormous amounts of energy in huge jets that happen to be pointed directly at Earth, making it appear extra bright in the sky.

The orbiting Fermi Gamma-ray Space Telescope had been conducting an all-sky survey over the same region and saw a gamma-ray flare at the same time. Over the next several nights, the ground-based Major Atmospheric Gamma Imaging Cherenkov (MAGIC) telescope in La Palma, Spain, trained its detectors at the same spot in the sky, collecting detailed images of the source.

THE POINT ON THE SKY THE NEUTRINO CAME FROM WAS A DISTANT GALAXY NAMED TXS 0506+056. IT'S A GALAXY ABOUT 12 BILLION LIGHT-YEARS AWAY WITH AN ACTIVE, ENORMOUS SUPERMASSIVE BLACK HOLE AT THE CENTER OF IT.

With the combined gamma ray observations, the researcher determined that the signal that IceCube saw was from a huge cloud of matter flaring as it fell into the black hole.

"The power of the accelerator is supplied by this supermassive black hole that was in a flaring state," Halzen said. "That increased the power it put out by a factor of six in the last few months."

The team reached out to the gamma ray telescopes in part because while IceCube can trace the tracks of neutrinos to a relatively small patch of sky, it's still pretty big astronomically speaking. The observatory can pinpoint the source of a neutrino to within a patch of sky is still about half a degree each side, or an area roughly the size of the full moon, which is too wide to definitively identify a precise source.

"For that purpose we would need an angular resolution that is 1000 times better, because there are many galaxies in a circle of one degree," Karle said. "In order to identify sources, we need the help of other astronomical instruments, telescopes."

The blazar TXS 0506+056 had been known to astronomers for years, but is only one of tens of thousands of such galaxies in the sky. While the gamma-ray telescopes were observing the blazar, Halzen and his team went through previous neutrino observations over the last decade of IceCube's operation and discovered a much bigger flare from three years earlier that also seemed to originate from the same patch of sky.

"Then we looked back in our own data and we found this huge flare in 2014, which made the thing that happened in September of last year look meaningless," Halzen said. "We basically had one neutrino [in 2017]. In 2014, we had 19 in 150 days."

The cluster of neutrinos in 2014 was biggest collective signal the observatory had ever seen, and was likely the result of an even more massive cloud of matter falling into the black hole. This additional event further confirmed that TXS 0506+056 is continuously producing high-energy cosmic rays as matter falls into its black hole.

The team will continue to review their data to see if there is previous evidence of other neutrino flares from other active galaxies.

Courtesy: *The Antarctic Sun*, U.S. Antarctic Program

The Antarctic Sun
"News about the USAP, the Ice, and the People"

Editor's Side Note: As the APS Executive Committee maneuvered the gauntlet of nonprofit administrative matters and prolonged periods required for account transfers, a few articles gathered months earlier have gone out of date. But because their content will likely be new to the majority of our readership, they have been left in. Henceforth, we will resume a more regular biannual schedule.

Lastly, though inclusion is not automatically guaranteed, new articles or content may be submitted directly to me via Email: moki.kokoris@gmail.com

Back Cover Photo: IceCube Lab under the stars – 2017. Credit: Martin Wolf, IceCube/NSF